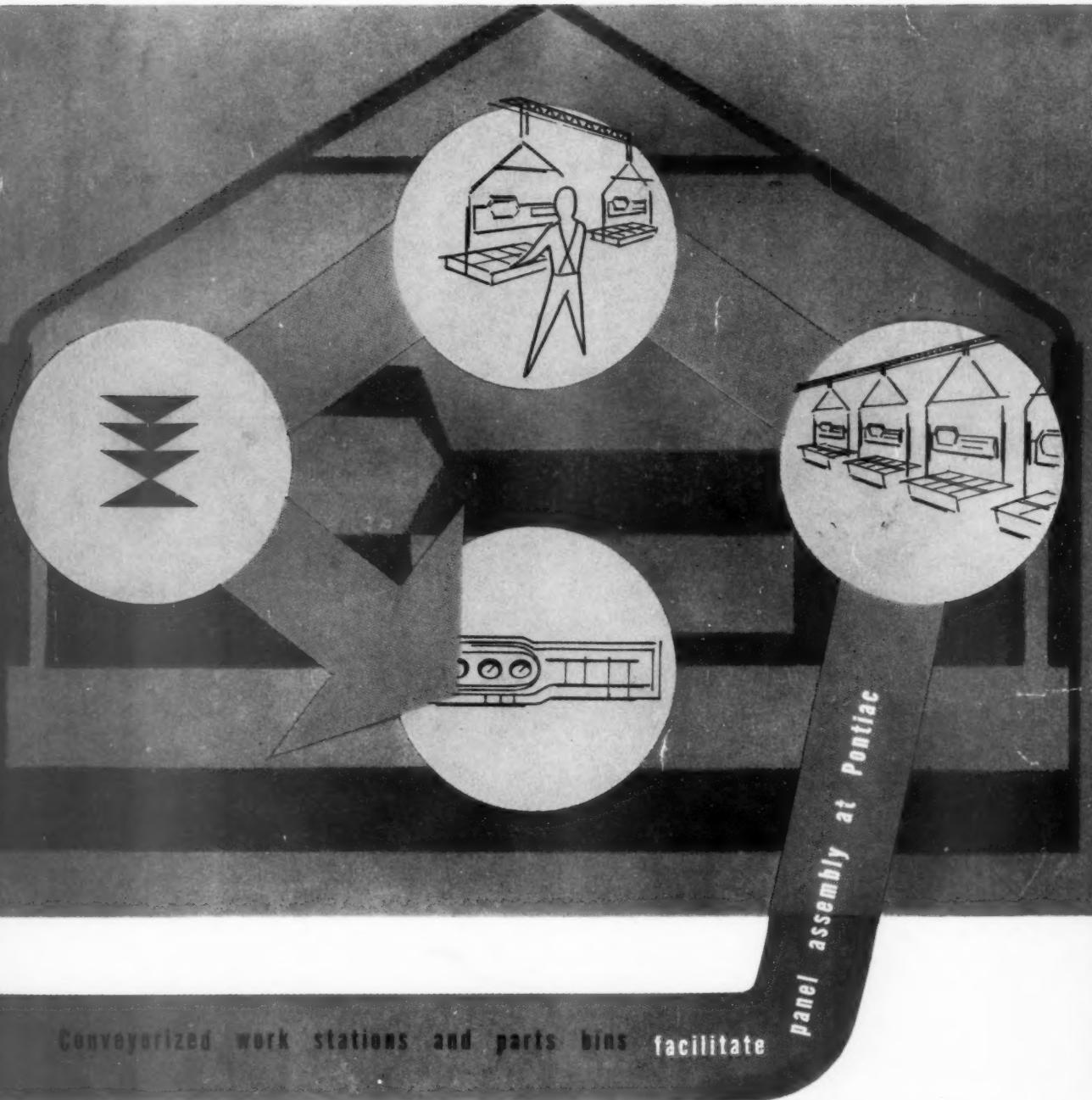


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JUNE 1961 — FIFTY CENTS



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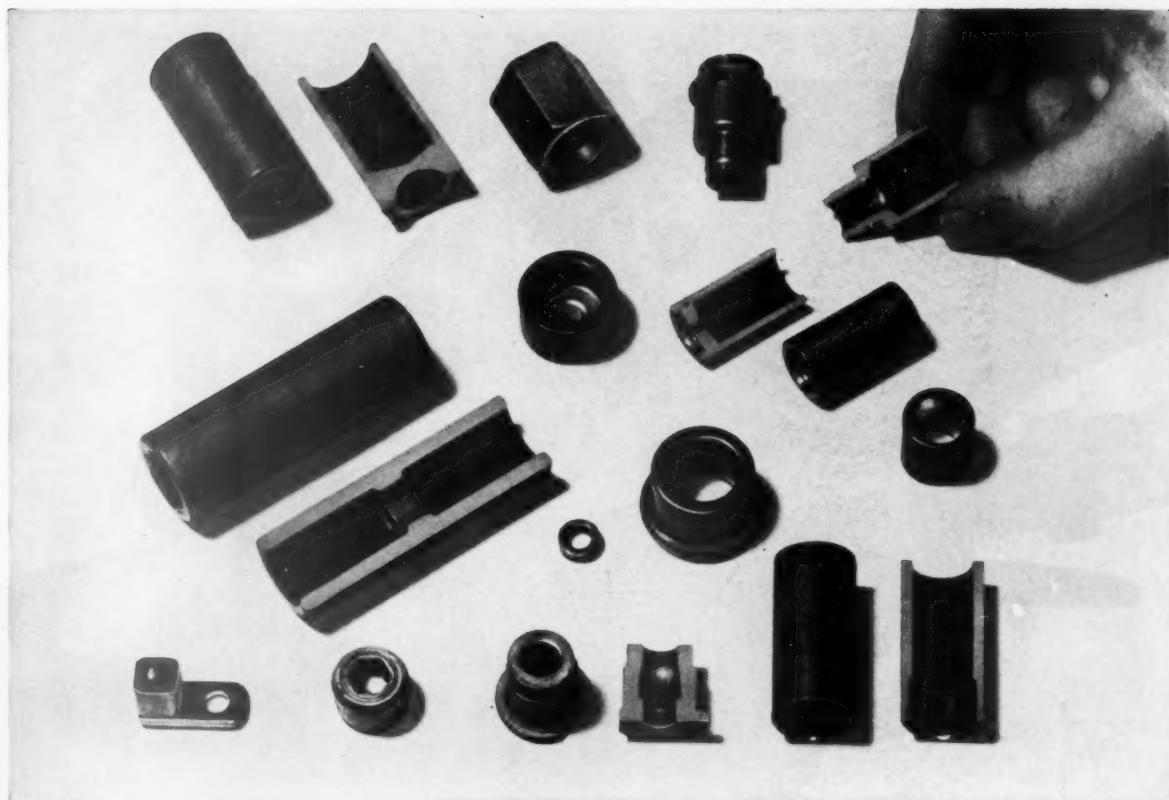
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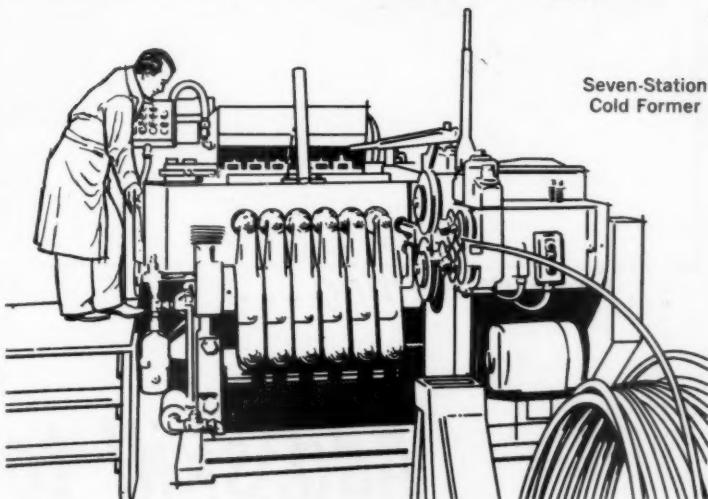
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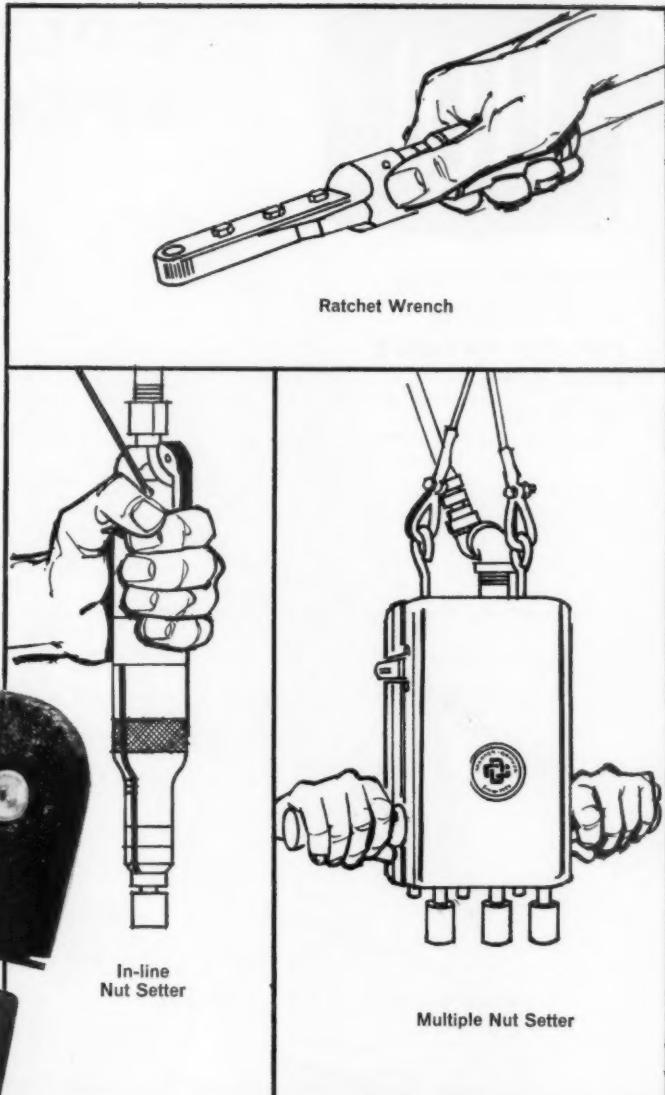
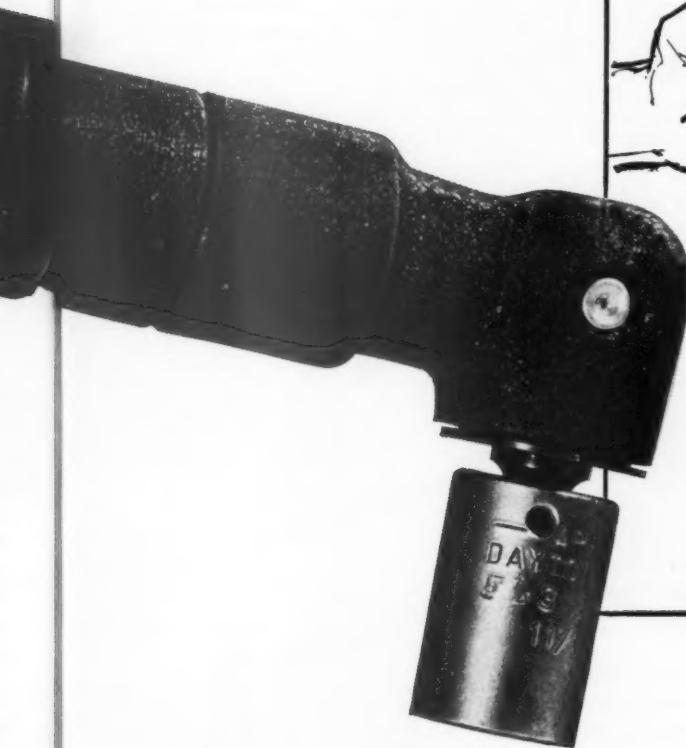


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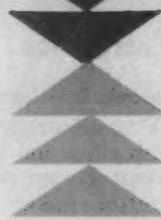
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## COMING NEXT MONTH

- The Role of Stud Welding in Solving Design Problems
- Structural Characteristics of Fasteners for Honeycomb

Volume 4, Number 6

June, 1961

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## Letters to the Editor

### Economic Conscience Appraisal

Your editorials are most timely. Keep them up, as our economic conscience needs a continuing dose of public inspection and appraisal.

John Babrowski  
Training Specialist  
Douglas Aircraft Company  
Long Beach, California

Sometime ago I indicated to you that one of the highlights of your magazine is the "Editor's View".

Upon receiving the May issue, and having read that page, again I feel compelled to indicate more directly and positively my continuing admiration and respect for your editorials. I trust these are being bound together in some book-form, inasmuch as they are, each one, a significant comment on our life and times.

I wish you well and exhort you to press on regardless.

O. S. Romine  
Body Truck Engineer  
Studebaker-Packard Corp.  
South Bend, Indiana

### Atomically Bonded Rivets

On page 18 of your April issue was a brief report on "Rivets Atomically Bonded to Precious Metals." If possible, we would like to receive more information concerning this subject.

P. BaDovinac  
Quality Assurance Engr.  
ITT-Kellogg Division  
Chicago, Illinois

• For more information, contact the Gibson Electric Co., Old William Penn Highway, Delmont, Penn.

### Self-Tapping Screws

Some time ago your magazine published an excellent article about self-tapping and thread-cutting screws. I have been unable to locate my copy of this particular edition, and would appreciate your sending one to me.

R. W. Gardner  
Purchasing Agent  
Crouse-Hinds Company  
Syracuse, New York

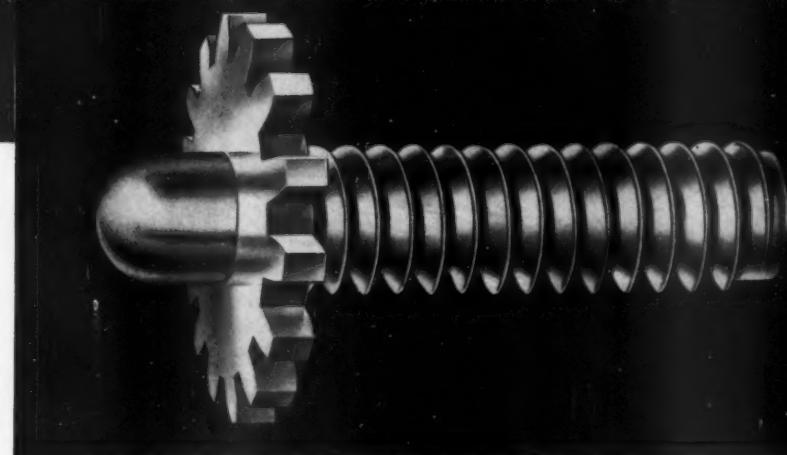
• The article referred to is probably the one entitled, "How Good Are the Self-Tapping Screws You Buy?", July 1959. Other articles on this type of fastener include, "New Fastener Drills and Taps Own Hole," May 1960, and "What Makes for Quality in Tapping Screws," February 1961.

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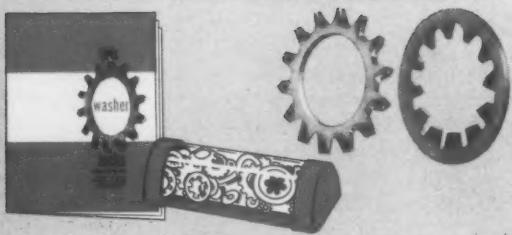
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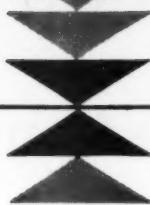
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Assembly & Fastener Engineering



## THE EDITOR'S VIEW

JUNE, 1961, VOL. 4, NO. 6

### LET'S STOP THE TALKIE-TALK AND GET SOME ACTION



Whereas a few months ago we set our sails for a new frontier, we now seem to be adrift on the sea of indecision. Everyone is talking about what should be done to improve business, meet foreign competition, contain the communist menace, and regain world prestige. But there's been little action as of this writing.

From the President on down we have had considerable talk about reforming our tax and depreciation laws to help spur industry into modernizing its production facilities. But if Congress has been embarking on a course of action, it's being kept a secret.

Of course, industry could knuckle down and go to work, but too many executives just cannot be concerned. Consider the problem encountered by a fellow editor who tried for three days to contact the head of a machine tool company to set up an interview. The first day he phoned at 3:30, the next day at 2:30, and the third day at 1:30. In each instance the executive had departed for the day; he apparently had no urgent work to keep him at his desk!

Or consider a meeting we attended where there was considerable roundtable discussion on the subject of foreign competition and how to

meet it. Two executives, who had traveled several hundred miles for this meeting, didn't seem too concerned; they were playing gin rummy in an adjoining room.

On the international scene, we have yet to draw the line from which the free world, under our leadership, will not retreat in the face of communist aggression. There's been a lot of talk though. And while we keep hedging, the commies keep grabbing more territory.

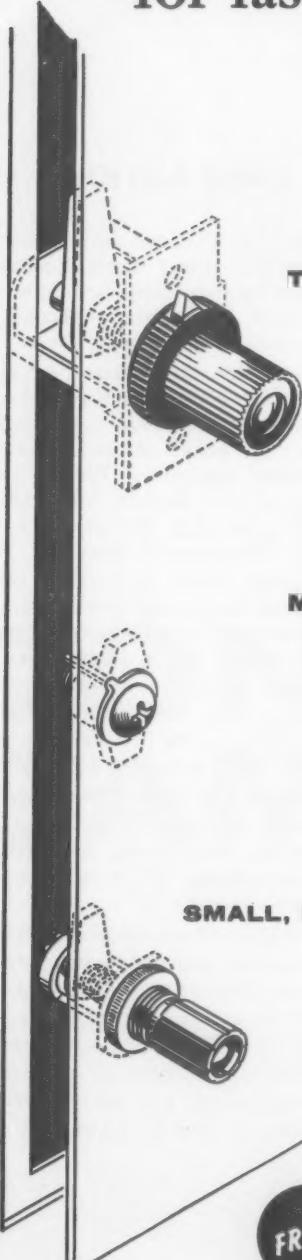
And there's been plenty of talk about the prestige lost in the astronaut race because of incessant work-stoppages at our missile bases. But what about the workers involved; have they been fired for actions contrary to the best interests of this country? Or do they still have a free run of our missile bases? Are the same military officers still in command, even though they permitted this sabotage to go on right under their noses?

There's been too much talkie-talk recently, and not enough action. If our domestic economy is to prosper, if we are to compete in the world market, if we are to regain our international prestige, and if we are to maintain our national security, then it's time for all of us to get to work.

*Matt S. Denney*

Editor

# Standards with unique features for fastening doors and panels

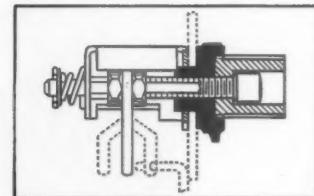


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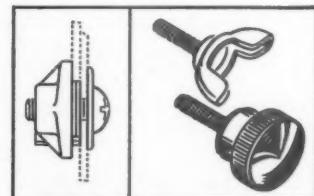
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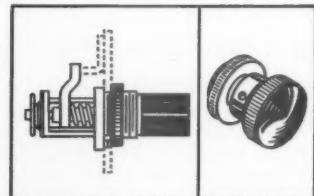
Materials    Pawl stop and washers: Carbon steel, cadmium plated  
                 Pawl: Nylon, natural



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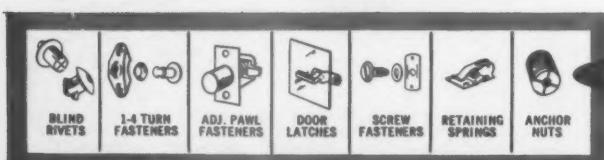
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# The State of Business



## PLANNING METROPOLITAN GROWTH—WHERE DO WE START?

by Committee for Economic Development, The Research and Policy Committee

The economic frontiers of America are in the metropolitan areas. Big public decisions lie ahead in these areas; decisions which will shape the opportunities for economic growth and a rising standard of living in coming decades. How much of our local resources, for example, should be allocated to overhead investments in public schools, waterworks, highways and mass transportation facilities? Should redevelopment programs give priority to commercial districts, industry, high, middle or low-income housing? What are the most equitable ways of paying for public services in local areas?

The way such decisions are made will vitally affect each community as a place to live, to work and to invest.

The public problems of a metropolitan area are so numerous that one may well ask, "Where do we start?" The proper starting point is the realization that a metropolitan community is a place for earning a living. Populations settle or expand primarily because of job opportunities. The daily movement of people is largely a result of job requirements. The development of public capital improvements and services occurs to a considerable extent to assist the economic activities of the area.

The first step towards meeting the problems of a metropolitan area is a detailed knowledge of its eco-

nomic base. The base includes all sources of income received in the area; wages, salaries, profits, rent, interest, dividends, and even pensions. Such income not only supports the population in the area, it is also the source of all public revenues derived from within the area.

Today, two out of three Americans live in urban areas. Technological advances have made possible a diffusion of plants, homes, and shops in a wide expanse around the older central city.

**There is no single formula** or pattern of government which is ideal for all metropolitan areas in our country. The reformulation of American political institutions in metropolitan areas is needed for modernizing our governmental structures in these areas.

The 192 metropolitan areas with central cities of 50,000 or more population have 16,000 local jurisdictions. They have struggled hard to maintain a semblance of orderly growth.

Although our local governments have kept things going in these areas, they have failed in one crucial area of public responsibility; they cannot plan, budget and program ahead for the entire metropolitan region.

**The heart of the problem** is the use of land and other economic resources, particularly public revenue resources, in our metropolitan areas in the most efficient manner.

Failure to establish metropolitan governments with wide powers will lead to a greater loss of self-determination in local affairs through the continuous transfer of responsibility to the state and Federal governments.

Within the span of a century, America has gone through two great changes in its living patterns. We shifted from a predominantly rural to an urban society, and more recently from a basically urban to metropolitan condition. Prior to the metropolitan era, cities were centers of industrial and commercial activity. The workers lived in closely built houses and tenements within walking distance of factories. Trolley car and subway lines went out only relatively short distances from the hub.

There was little question where the city ended and the country began.

**The metropolitan area** is in effect a new community. Its boundaries often are hard to define. In some instances, they change and expand frequently. The area ignores old geographic boundaries. It also ignores the political lines of districts, villages, towns, cities, and counties.

Other problems are of such mounting importance that sooner or later they will compel governmental action. A metropolitan level of government could cope with problems of air pollution or transportation without sacrificing local control.

*continued*

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Barring a change in existing patterns, growth will continue in urban-metropolitan regions. Such concentrations are evidently necessary to take maximum advantage of technological opportunities that give us a high and rising standard of living.

Less evident are external economies of aggregation in urban areas. These are savings available to the individual industry in the form of services or facilities outside the plant and shared with other producers.

Within metropolitan regions, we are witnessing a significant redistribution of economic activities.

**The large scale breakout** of residences, commercial activities and manufacturing from the bounds of the central city has produced a number of major problems. Each part of the metropolitan area is faced with problems peculiar to itself. This diversity strengthens the feeling of mutual antagonism between city and suburb. The area as a whole, however, faces problems which cannot be dealt with adequately on a piecemeal basis. Yet, so far, few areas have developed institutions which can adequately deal with these problems, and the prevailing antagonism between city and suburb inhibits the development of such institutions.

The expansion of income-generating activities is desired by practically all metropolitan areas, both to provide more jobs and to provide an expansion of the tax base. The most important economic activities generally sought are expanded or new manufacturing plants.

The success of local communities in attracting new industry is partly dependent upon the expansion of the national economy and the region's economy, and some factors in industrial location are beyond the control of individual localities. But other influential factors can be controlled within the metropolitan area. Among these are space for industry, traffic, public services, the attractiveness of the community as a place to live and the scale of local taxes.

This article was written from data compiled in the booklet "Guiding Metropolitan Growth" by the Research and Policy Committee of the Committee for Economic Development.

Some of the additional functions of government may be viewed as social costs of metropolitan togetherness. Public services provided by governments in metropolitan areas are claiming an increasing share of our economic resources. We expect more from local governments and our preference for low-density living is raising the cost of providing public facilities.

Between 1902 and 1957, the annual outlays of all governments rose from slightly less than \$1 billion to about \$31 billion.

**Metropolitan growth** has placed heavy demands on the government structure to meet new and expanding local and area-wide needs. One response has been a great increase in the number of local units. The Chicago area for example, had 55 units of government in 1890 and 960 in 1954.

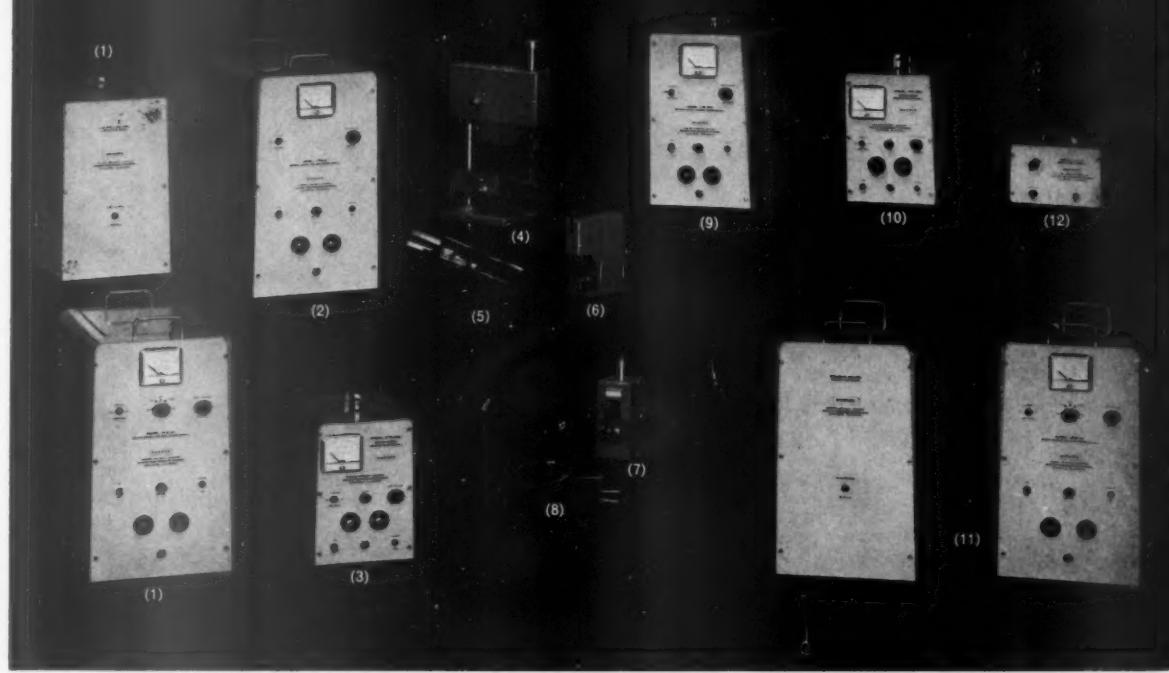
Another development is increasing reliance on a higher level of government to meet area-wide needs. In recent years the difficulty of meeting area needs from local resources has pushed the call for assistance to the Federal level.

But the collection of municipalities and small special-service districts, the area-wide agencies, the state and Federal agencies devoted to meeting a single need are not able to formulate effective governmental policy for the metropolitan area as a whole. Decisions as to area-wide priorities are made by conflict among these special purpose, region-wide, and higher-level agencies.

Business men and other members of the community must be willing to assume greater responsibility in working with the elective officials, staff technicians and others in the determination of metropolitan goals and the implementing of public programs. There are many ways to help, the most common is, of course, the local chamber of commerce.

**Business leadership** can emphasize the importance of establishing specific goals and a system of community priorities in the use of resources. Stressing the usefulness of factual studies, and economic base analysis, business can urge a metropolitan-wide and long-term point of view. With these guidelines and planning for future development, we can begin to transform our local governments into modern institutions equal to their responsibilities.

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**VACUUM TUBE PRODUCTS DIVISION**  
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- (1) **VTW-32**  
1 to 250 watt-second power supply
- (2) **VTW-31**  
2 to 200 watt-second power supply
- (3) **VTW-26B**  
1/2 to 40 watt-second power supply
- (4) **VTA-42**  
Medium duty weld head
- (5) **VTA-24**  
Medium duty welding handpiece
- (6) **VTA-40**  
Compact miniature weld head
- (7) **VTA-39**  
Miniature weld head
- (8) **VTA-12**  
Tweezers type handpiece
- (9) **VTW-30B**  
1/2 to 100 watt-second power supply
- (10) **VTW-26B**  
0 to 10 watt-second power supply
- (11) **VTW-33**  
2 to 500 watt-second power supply
- (12) **VTA-41**  
Weld speed control



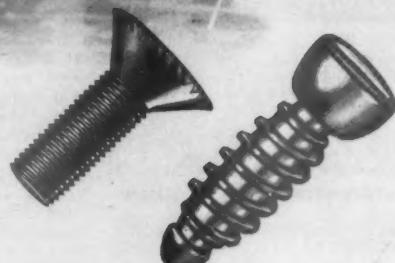
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National Lock's diverse production capacity is geared to satisfy all your standard and special-purpose screw requirements.

Fasteners to your exact specifications . . . delivered when you need them . . . in the quantities you require. Write us.



# NATIONAL LOCK

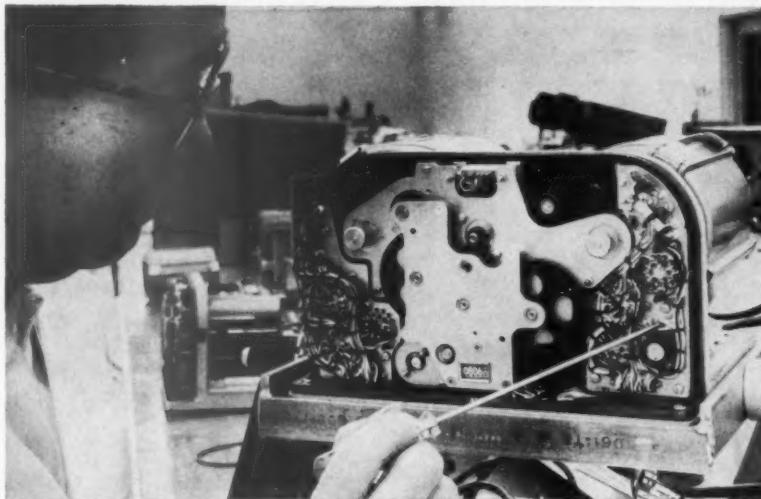
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## Ideas and Field Reports



### ADEQUATE LIGHTING INSTALLATION IMPROVES ASSEMBLY OF AERIAL CAMERAS



Shadow-free lighting installed in Chicago Aerial Industries' white room, facilitates precision assembly of photographic unit.



Luminous ceiling in 7600 square foot white room is expected to provide a maintained level of 250 foot-candles.

Lighting systems designed to help productive efficiency have been incorporated in the recently completed three million dollar plant of the Chicago Aerial Industries, Inc., Barrington, Ill.

Chicago Aerial, manufacturer of precision aerial photography systems, had the lighting system installed in accordance with recommendations of lighting engineers of General Electric Co.

Various lighting levels were first evaluated in relation to the tasks being performed. A trial installation was then installed in a similar plant to test the practicality of higher level lighting. The system, using GE Power Groove fluorescent lamps, provided a visible demonstration of about 200 foot-candles versus the former, commonly used 50 foot-candles and helped demonstrate how higher levels of illumination could be reached economically.

The new building containing 182,000 square feet uses different levels of lighting, depending upon the type of activity.

In the precision assembly "white room," a luminous ceiling has been installed which will provide a minimum of 250 foot-candles. Present levels in the room give a highly adequate 325 foot-candles of light, making precision assembly less fatiguing for the employees.

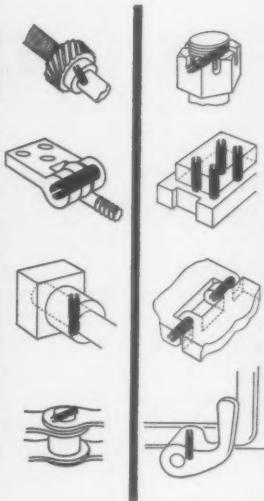
The use of adequate lighting in the engineering design area, where currently 225 foot-candles are provided by a luminous ceiling installation has eliminated the need for supplemental individual board lighting.

*continued*

EVERY TYPE OF KEYING AND PINNING DEVICE FOR PRODUCTION ASSEMBLING

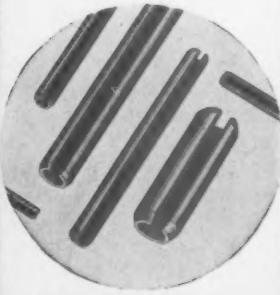
**GILLE**N

**Self-Fitting  
TENSION PINS**  
Speed  
Many Assemblies  
and Stay Put!



**Tension holds them Tight!**

in Metal/Plastics/Ceramics



**GILLE TENSION PINS**

are hollow, hardened, chamfered-end spring steel fasteners designed to hold many materials efficiently and reduce production-assembly costs.

Diameters: 3/64ths to 1 inch.  
Lengths: from 3/16ths inch.

WRITE FOR STOCK SIZE  
LIST & PRICES



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PIVOTS • BUSHES • TENSION, TAPER, GROOVE & DOWEL PINS • MACHINE KEYS & PARTS

Ideas and Field Reports, continued

Important also is the fact that in both rooms, the lighting is exceptionally glare-free and shadowless.

Architects for Chicago Aerial's new plant were Fridstein, Fitch, Schiller & Frank, Chicago, Ill.

**DIE CAST BLOCK HELPS MAKE REAL PISTOL SOUND**

An automatically die cast L-shaped zinc alloy block, weighing .06 ounces, helps make "music" for the "Ric-O-Shay" toy pistol, produced by the Hubley Manufacturing Co. of Lancaster, Pa.

The toy pistol produces the sound of a whining bullet each time its trigger is pulled and released. The sound producing device is mounted in the handle of the pistol.

The zinc alloy block rigidly holds a tempered piano wire after it has been insert cast by the automatic die casting technique developed by Gries Reproducer Corp. The L-shaped block is die cast around the base of the wire to hold it firmly in place so as to reproduce the proper tone of the pistol. Any play of the wire would deaden the tone.

The sound is achieved after the trigger action causes the curved wire to vibrate against a small brass diaphragm. The wire itself is



Die cast L-shaped zinc alloy block holds tempered piano wire in precise position to give toy pistol true ricochet sound.

"tuned" by tapping the block deeper into the receptacle until the desired tone is obtained.

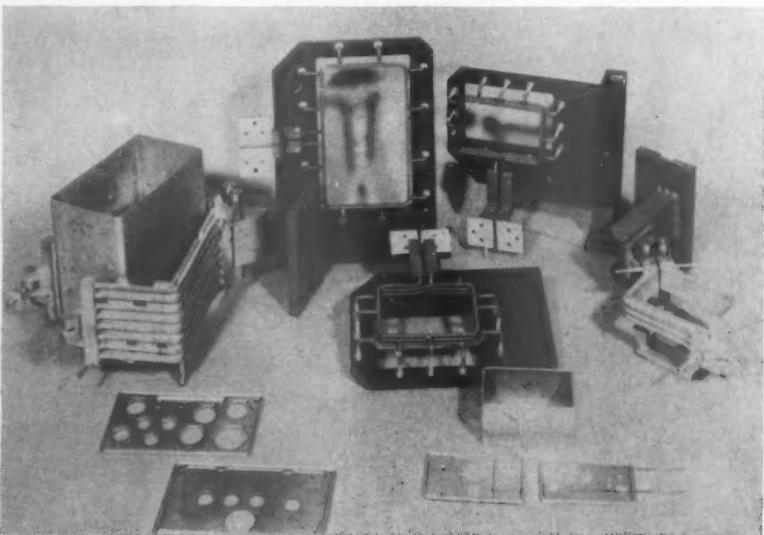
Other aspects in the assembly of the Ric-O-Shay pistol were reported in the Sept. 1960 issue of Assembly & Fastener Engineering.

**USE INDUCTION HEAT TO UNSOLDER INSTRUMENT CASES**

Cases which house instruments valued at several thousand dollars, have for some time been soldered by use of induction heating.

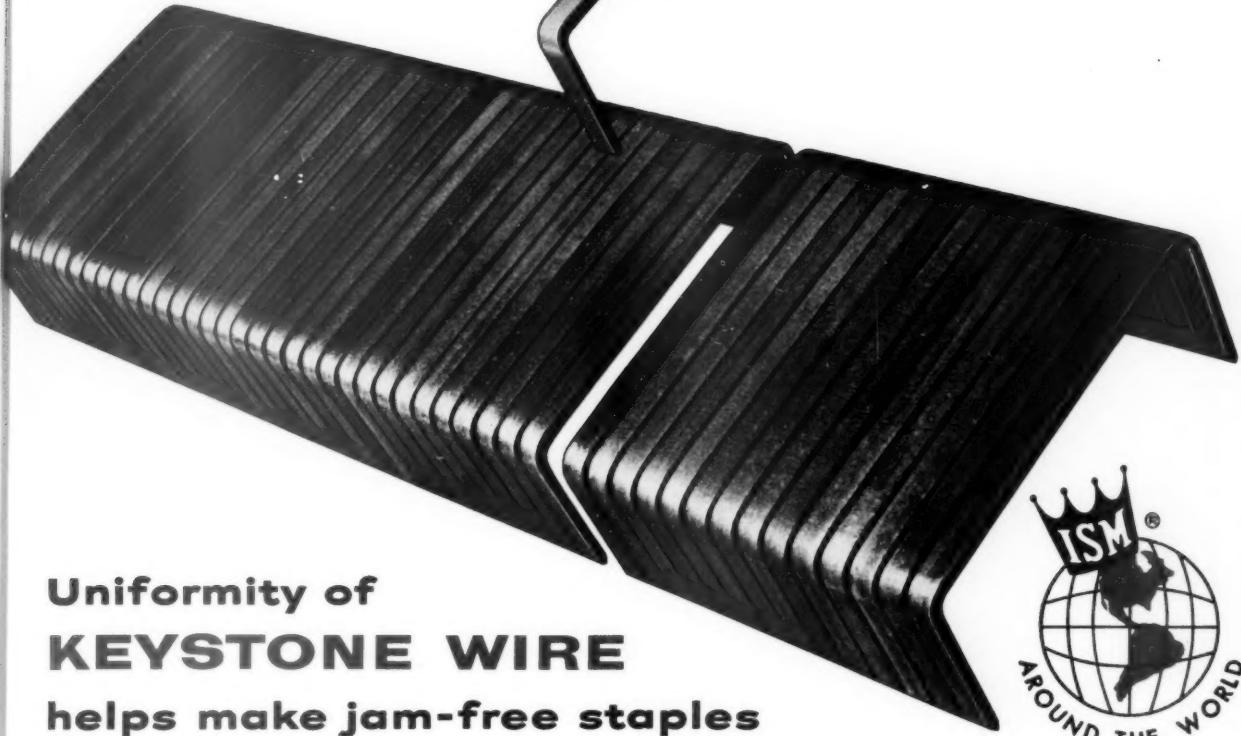
The repair of the instruments have always presented a problem, since they could not be unsoldered easily.

*continued*



Several sizes of induction heating units used to unsolder instrument cases.

# UNIFORM



## Uniformity of **KEYSTONE WIRE** helps make jam-free staples

To produce jam-free staples calls for absolute uniformity of wire temper and diameter and unvarying staple dimensions. Holding to tolerances of plus or minus .0005", International Staple and Machine Company, Herrin, Illinois, manufacture their Gold Crown® carton closing staples. The wire used is a special bright finish, copper-coated steel wire of cold rolling quality furnished by Keystone Steel & Wire Company. This round steel wire must have (1) correct temper throughout the coil, (2) critical tensile range and (3) a copper coating which works perfectly with International Staple's high-speed staple forming machines.

Mass production of steel staples by International Staple has been increased because of the forming characteristics of Keystone Wire which allow the wire to conform exactly to required tolerances and shaping.

In addition Keystone designed and built a platform carrier to control wire take off. This carrier means less scrap, longer runs, better protection in transit, better storage, easier wire handling and less time to set up the wire for the cold rolling operation.

Specifications for your product can be accurately analyzed and every detail closely controlled at Keystone. The wire you require can be uniformly produced through the latest and most exact methods known to the steel industry. Send us your specifications for our recommendations.

*No. 16 platform carrier  
600 lbs. continuous coil.*



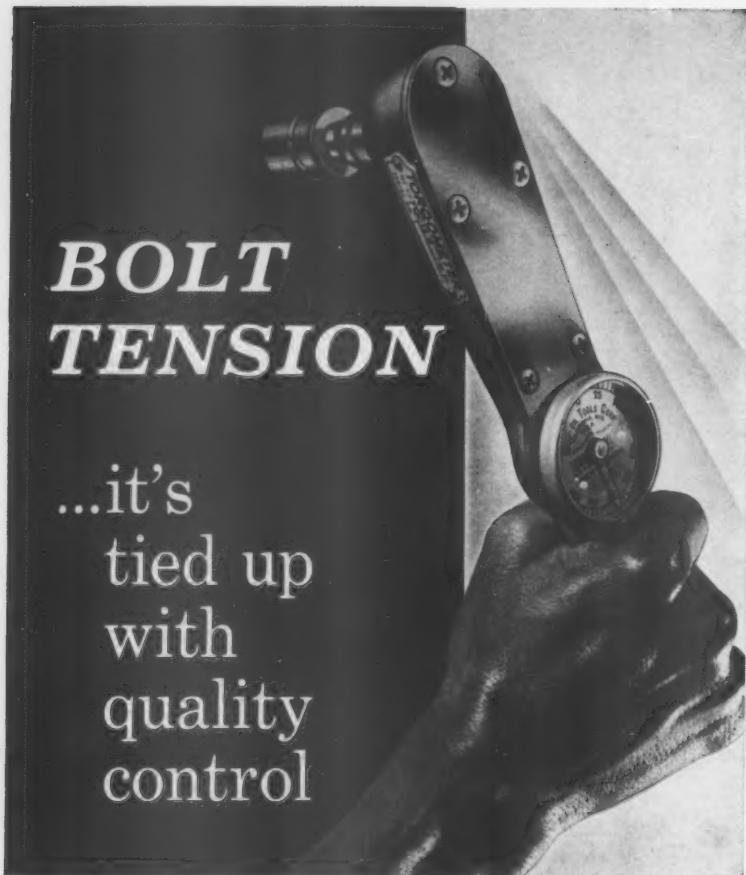
*Keystone Steel & Wire Company • Peoria, Illinois, U.S.A.*



**KEYSTONE**

WIRE FOR INDUSTRY  
MADE AT PEORIA, ILLINOIS, U.S.A.

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Correct tension, that is, of bolts, studs, screws, and other fasteners used in product assembly. Without tension control there is no quality control.

For example, uneven tightening of head bolts causes warping and engine trouble. Improper tension of fasteners in aircraft components sets up dangerous stresses and strains. Measuring devices, electronic components, frames, fittings, high-pressure containers — these and many other products require uniform tension on screws and bolts for proper operation.

That is why **SNAP-ON®** Torqometers® are being used more and more on assembly and maintenance work. These precision wrenches tighten bolts and studs to exact predetermined tensions. Or they may be used to spot check the tension on bolts tightened with power impact tools. Easy-to-read dials show torque measurement in either inch-pounds or foot-pounds.

**SNAP-ON** offers Torqometers in a wide range of sizes, plus torque drivers for proper tensioning of screws. These are widely used in electronic and electrical assembly.

If exact tension on fasteners is part of your quality control, or if you suspect that lack of such control may be a source of trouble, call in a **SNAP-ON** Sales Engineer. He can offer qualified advice on torque-measuring problems, and provide a complete range of hand tools and wrenches for assembly or maintenance. Write us or call your nearest **SNAP-ON** Branch.

FOR ALL INDUSTRY  
**SNAP-ON TOOLS**  
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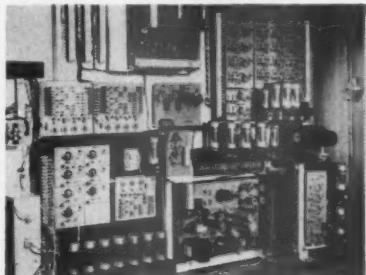
#### Ideas and Field Reports, continued

Due to the non-uniformity of heat, a torch or iron could not be used, and also the fact that too much heat could be applied was always present.

With the aid of an induction heating generator with a 5kw output, 450 kc, these soldering and unsoldering jobs are quickly handled, even in field repair of the instruments.

The units were developed by the Induction Heating Corporation.

#### UNIT TESTS COMPLEX ELECTRICAL SYSTEMS



Detail of electronic components used in automotive electric system inspection unit.

An electronic unit designed and built by the Performance Measurements Co., is being used to test the complex electrical systems of all Lincoln Continental automobiles.

With the unit, all existing electrical system troubles are spotted before each automobile leaves the production line. Also, a maximum of potential troubles are spotted at the same time. These are all corrected at considerably lower cost than if they had to be corrected after delivery from the factory.

The entire electrical system of an automobile can be checked against specified standards and the findings permanently recorded in 15 minutes of inspection time. Previously two or more hours were required for the same cycle of tests.

The unit also enforces a rigid yardstick of electronically controlled standards. Depending on optional equipment, the number of components tested by the machine is as high as 339.

The inspector conducts all the tests from the driver's seat of the car under tests by means of a re-

continued

DO THE JOB  
FASTER,  
BETTER,  
CHEAPER!



### ACF-ERCO AUTOMATIC PUNCH RIVETERS

are from 4 to 11 times faster than any other fastening tool or technique • liberate up to 80% of existing manpower • eliminate diework and related handling operations • reduce rejects to an absolute minimum • improve strength, uniformity and consistency of joints • increase product quality and sales appeal.

Lightweight (25 lb.), portable model punches holes, places and heads flush- or round-head rivets in less than 2 seconds total cycle time • standard pneumatically-powered line achieves speeds up to 45 rivets per minute • "One Man-One Machine" operation means man-hour economies as high as 90%.

For specifications, free brochures or inquiries, write:  
ERCO Machine Tools, ACF ELECTRONICS DIVISION, Riverdale, Maryland.

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DIVISION

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# PLANETARY THREAD ROLLING MACHINE CUTS COSTS

## Rolls External Threads on HOLLOW WORK

### Class 3 Fit

## 9,000 TO 20,000 PIECES PER HOUR



IF YOU ARE NOW BUYING tube nuts like these, you can cut costs by heading them yourself and roll-threading the hollow parts on a Prutton Model 300. You can buy cheaper stock (rolled wire) and make your own parts.

IF YOU ARE NOW MAKING THESE PARTS ON A SCREW MACHINE, you can get "cold forged" quality faster for less than the cost of cutting or grinding. No need to buy expensive hex-stock. And, you eliminate these screw machine operations: drilling, turning, chamfering, threading and cut-off.

The Prutton Model 300 is the only **high speed** machine on the market for external roll-threading of hollow work. It can roll-thread as many as 18,000 pieces per hour with a slow die speed of only 164 fpm—which means long die life.

Speeds output many times—cuts costs 50%—improves quality—saves man hours and floor space. Used by some of the biggest names in American industry.

**VERSATILE:** Built primarily for hollow work . . . but may also be used on solid work in a wide range of metals and sizes.

### HIGHER OUTPUT AND LOWER COSTS ADD DOLLARS TO YOUR THREAD ROLLING PROFITS . . .

A Prutton can be used for thread rolling, roll forming, knurling, marking, serrating and necking of threaded hollow work, special parts, nails, bolts and screws in a wide range of sizes. Send prints and/or samples for free estimates on machine costs.

Write or Phone for Cost Savings Information TODAY!



**PRUTTON CORPORATION**

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20

Ideas and Field Reports, continued



Inspector makes complete electrical system check on automobile from driver's position in the car.

mote control unit in his hand. He observes vehicle operation on a single indicator on the front of the testing unit.

### TENSION CALIBRATOR AIDS AUTOMOTIVE STANDARDS

A joint research and development program in fastener applications and techniques of Detroit auto company and an instrument manufacturer have made possible what is believed to be the automobile industry's most positive fastener standards.

Using a bolt tension calibrator instrument designed by the Skidmore-Wilhelm Mfg. Co., a program was begun two years ago to establish torque-tension relationships in fastener applications.

Through the establishment of relationships, positive torque specifications on each application can be provided. Further, every nut and bolt combination under any possible application can be tested rapidly.

The effects of the program can be measured beyond engineering and quality control.

One important effect is the elimination of duplications in bolts and nuts, enabling an inventory reduction.

### EXTRUDED SEALER PERMITS SEALING OF TAPER JOINTS

Two extruded rubber base sealers with a cross sectional "double donut" design permits positive sealing of uneven or tapered joints. The sealers, manufactured by Minnesota Mining and Manufacturing Co., can also be bent 90° without the need of cutting and fitting.

The sealers, one hollow, the other solid, are designed to seal between mating metal surfaces.

continued



A Tinnerman T-Marked Original...

## Dual SPEED NUTS® open door to 20% savings on as-assembled cost

Gibson refrigerator door hinges are held in place with new cost-cutting, time-saving twin-type SPEED NUTS. They replace  $\frac{3}{16}$ " plate hinge retainers which had to be drilled and tapped for machine screws.

Gibson Refrigerator analysts estimate that special twin-type SPEED NUTS save 14% on the cost of each hinge retainer assembly, 20.5% on the as-assembled cost. Labor is reduced by half. Former problems with cross-threading and stripping are eliminated... SPEED NUTS and A-type screws go together naturally every time—and faster!

The T-mark of quality and dependability identifies the more than 10,000 variations of SPEED NUT brand fasteners. From this unlimited selection come many saving opportunities for you. Ask your Tinnerman representative to arrange for a free FASTENING ANALYSIS of your product. An engineering service that may produce similar savings for you.

You'll find Tinnerman under Fasteners in your SWEET'S Product Design File and in the "Yellow Pages." *Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio.*

### OTHER T-MARKED SPECIALS



**SPECIAL "J" SPEED NUT** cuts production time in half for a major gas range manufacturer. Simplified right-angle panel or brace attachments for a variety of appliance, cabinet, and instrument applications. Live-spring tension means a vibration-proof grip.



**SNAP-IN FIXTURE FASTENER** developed specially for Imperial Lighting Products Co., trimmed 80% off lighting fixture assembly time. Once fastened to the ceramic socket, this unique SPEED NUT snaps quickly into the fixture base...replaces three parts.

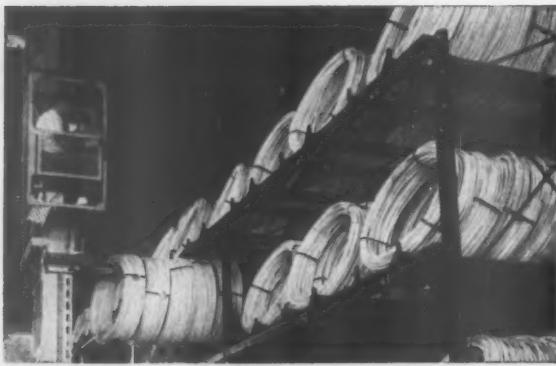


**PUSH-ON SPEED NUT** anchors latching bars on steel desks, reduces material and assembly costs by 50%. Push-on SPEED NUTS can be attached on studs, rivets, or tubing in a split second, and eliminates need for threaded parts...saves time and money.



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CANADA: Dominion Fasteners Ltd., Hamilton, Ontario.  
GREAT BRITAIN: Simmonds Aerocessories Ltd., Tre-  
forest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon  
de Rothschild, Suresnes (Seine). GERMANY: Mecano  
Simmonds GMBH, Heidelberg.



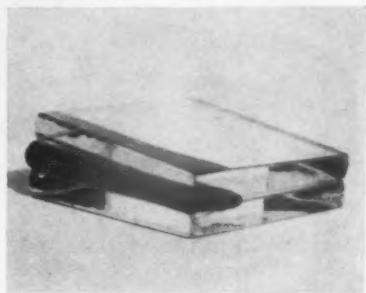
FOR CONTROLLED QUALITY.



FROM START TO FINISH



10016-CH



Hollow sealer permits greater compression in uneven seams, while solid sealer has better void filling characteristics.

When sealing the mating metal surfaces, the sealer is lightly pressed to one of the mating surfaces by hand. Because the sealer has good adhesive properties, it will remain in place, even when in a vertical position, until the mating surface is assembled.

**CHAIN SAW MAKER USES  
INSERTS TO REDUCE COSTS**



Insert is installed at a critical fastener mounting location of the spiked bumper plate of chain saw.

To reduce its installation costs, and provide easier maintenance at critical points, the Homelite Division of Textron Inc., Port Chester, N.Y. is increasing the use of inserts in the manufacture of its chain saws.

At present, three Tap-Lok inserts, manufactured by Groov-Pin Corp., are used in the magnesium saw housing. In future models, two additional inserts will be used to fasten the fan housing.

All of the locations where the inserts are used are those which require frequent assembly and disassembly for maintenance and repair work.

In addition to the advantages of easier maintenance and repair, the

*continued*



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FOR PRECISION FASTENERS**

Precise chemical, metallurgical and dimensional controls embodied in every Chandler fastener are your assurance of high quality fasteners to meet critical performance requirements. Chandler employs advanced production techniques . . . tests for tensile, yield, creep and stress rupture to meet military and industrial standards . . . produces the finest cold-headed cap screws and bolts from high carbon, alloy, super alloy and stainless steels *economically, efficiently and on-schedule!*



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if you operate cold headers



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# EXTRUDOIL #51 DO Concentrate is for you...

HERE ARE JUST A FEW OF  
OVER 35 DIFFERENT MACCO PRODUCTS  
COMPOUNDED WITH SPECIAL ADVAN-  
TAGES FOR FASTENER MANUFACTURERS

Mac Draw #169  
Tube Lube "B" • H.D. #14-C  
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If you're interested in RESULTS, not just promises, you owe it to yourself to find out why Macco Extrudoil #51 DO Concentrate is THE LUBRICANT for cold heading. In plant after plant, throughout the fastener industry, it is being used, every day, for high volume, high quality production. REASON? Experience has dictated that Macco Extrudoil #51 DO Concentrate is the one lubricant that does the job best! It's that simple. Get all the facts and a trial from your Macco engineer. You'll see the many advantages other fastener manufacturers are now enjoying.

THE METALWORKING INDUSTRY LOOKS TO MACCO FOR LEADERSHIP

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# "Special" RIVETS ARE NATIONAL STANDARDS!

No single style of rivet can do every job, or even many jobs perfectly, or at lowest cost.

National, therefore, produces thousands of types, sizes and shapes—each designed to fill the engineering requirements of a particular application.

Because National has the dies and facilities to produce so many types of rivets, you are assured of getting the correct rivet for your job at mass production prices.

## NATIONAL RIVETS AND RIVETERS DO THE JOB BEST

Nearly 90% of all rivet setting machines in use today are low cost single floor or bench type riveters. These machines can be operated by semi-skilled and even unskilled workers with excellent results and speed. They can be fitted with jigs for precision fastening and easily converted at any time for new applications. Multi-headed riveters are also available where the job warrants.

National's rivet setting equipment is available through purchase, or a lease plan if a capital investment is not desired. Why not investigate National to see how little it takes to convert a costly fastening procedure to simple, fast, profit-saving riveting?

Send your blueprints or the fastening job for a prompt, helpful solution to your fastening problems.



**NATIONAL**  
**RIVET & MFG. COMPANY**  
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Ideas and Field Reports, continued

inserts provide good reinforcement for the casting, especially in the bumper plate, where they absorb great shock.

## ALUMINUM RIVETS USED IN COMPONENT ASSEMBLY



Aluminum rivets, less than 5/64" long, are being used in the component assembly of hearing aids, stenographic dictating equipment, and transistor radio receivers, by Dyna Magnetic Devices, Inc.

The tiny fasteners are produced by Aluminum Company of America from 0.042" diameter wire. One cold heading machine batters the wire into rivets, and produces over 90,000 pieces per pound of wire.

## UNIT WELDS EXTRUDED ALUMINUM MITER JOINTS

Designed for joining mitered corners of extruded aluminum members, a flash welding machine features a high capacity bi-directional clamping system, welding dies that nest in the extrusion, and adjustable components that allow up to one degree of angular variation to compensate for parts shrinkage.

Attached to the F-3 Thomson electric flash welding machine, a set of two pneumatically operated clamps positions the work, aligns it for a resulting exact perpendicularity. Variations in an angle can be compensated by adjustments.

The welding cycle is controlled by a synchronous mechanism, patented by Thomson Electric Welder Co. Such variables as the amount of flash-off and upset, flashing time or speed, the upset force and the current cut-off can be set without the necessity for developing and changing cams.

# Now... Sylvania cuts the price of automation

New, compact 44-station automatic transfer machine brings the benefits of automation within reach of most manufacturers.

It's about half the size of other top-quality transfer machines, far less expensive, too. What's more, it dovetails neatly into the trend to smaller and smaller products and assemblies by providing more stations per foot.

It's a machine that could be ideal for you if you make any product that involves several station-to-station operations.

## WHAT IS A TRANSFER MACHINE?

It's automation's basic building block. It moves pieces-in-production from one tool or worker to another, stops the piece long enough so it can be bent, drilled, tapped, heated, measured, molded, riveted, coated, assembled, packaged, etc.

Sylvania makes several models of these basic machines. And if you do not have facilities, we can recommend reliable and experienced manufacturers of the necessary tools, jigs, etc., which you'll need in your automation program.

## HOW TO AUTOMATE

That's a tough one. It varies almost with each manufacturing operation. Sylvania will provide free consultation to help with your particular problem but, in any event, there's one basic rule for almost every situation: *You must start with the best transfer machines if you're going to realize the full benefits of automation.*

Naturally, you pay more for the best. But a good transfer machine can last for 30 years or more. What's more, by changing tools and jigs, it can be adapted to almost any conceivable production operation. You can even change

products without changing transfer machines.

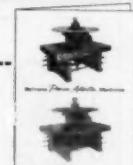
## WHERE TO BUY

Naturally, we're a bit biased, but we believe Sylvania transfer machines are the best on the market.

We've been building them for our own use for over 20 years, because we have never been able to buy one that met our accuracy standards for the manufacture of lamps, tubes, fine electronics equipment.

We make two general types—Rotary indexing chassis and Conveyor indexing chassis. Both have many exclusive features which contribute to their outstanding performance. And we also make 5 models of precision indexing transmissions of superior quality.

**FREE HELP—AND INFORMATION.** If you're thinking of automating, we'd be glad to have one of our automation sales engineers call on you with his suggestions and advice. Or, if you'd like more details on Sylvania transfer machines, send for our free brochure.



### SYLVANIA LIGHTING PRODUCTS

Equipment Development Plant  
121 Loring Avenue, Salem, Mass.

*Please send me free brochure of:*

Rotary  44-Station Conveyor and 80-Station Conveyor  Transmissions

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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# Send ESNA YOUR ROLLPIN® NEW- A

WHERE CAN YOU USE  
THIS SIMPLE FASTENER?



ROLLPIN is the slotted tubular spring pin with chamfered ends that is cutting production and maintenance costs in every class of industry. Drives easily into standard holes, compressing as driven. Spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. ROLLPIN is readily removable and can be re-used in the same hole. Made in carbon steel, corrosion resistant steel and beryllium copper.

Valuable prizes for

ROLLPINS seem to find new cost-saving uses almost daily. The 9 examples pictured below—where ROLLPINS are shown replacing 9 types of fasteners—only begin to indicate ROLLPIN's wide areas of usefulness. We know of dozens of variations of the nine uses shown. You must certainly know some, too. So tell us yours—it could be a winner!

*P.S.* If you aren't now using ROLLPINS these 9 examples may give you some useful ideas. So why not write for a generous sample assortment of ROLLPINS and complete information. Dept. R61-697.

ROLLPIN REPLACES 9 DIFFERENT FASTENERS								
		<b>REPLACING A GROOVED PIN . . .</b> here Rollpin serves as a stop pin. Its light weight and shear strength function perfectly . . . cuts assembly costs.			<b>REPLACING A SET SCREW . . .</b> a short length Rollpin is self-retained in the handle of an automobile brake. Is readily driven into over-drilled hole in shaft for easy removal.			<b>REPLACING A HEADED PIN . . .</b> in this hinge pin application, constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.
		<b>REPLACING A RIVET SHAFT . . .</b> Rollpin serves as an axle for the sparkwheel of a cigarette lighter. No riveting or threading necessary. Faster assembly.			<b>REPLACING A CLEVIS PIN . . .</b> here Rollpin holds firmly in clevis, permits free action of moving member.			<b>REPLACING A HUB ON A GEAR . . .</b> Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. Rollpin's shear strength is particularly valuable here.
		<b>REPLACING A COTTER PIN . . .</b> Rollpin assembly time is shorter, service life ten times longer. Vibration-proof flush fit. Easily removable.			<b>REPLACING TAPER PINS . . .</b> Rollpin eliminates cost of taper pin reamers and the entire reaming operation. Rollpin costs less than a taper pin and installation is cheaper.			<b>REPLACING A BOLT AND NUT . . .</b> Rollpins act as fasteners and pivots . . . may also be used with a free fit in outer or inner members depending upon product design requirements.

# APPLICATION IDEA

*the winners!*



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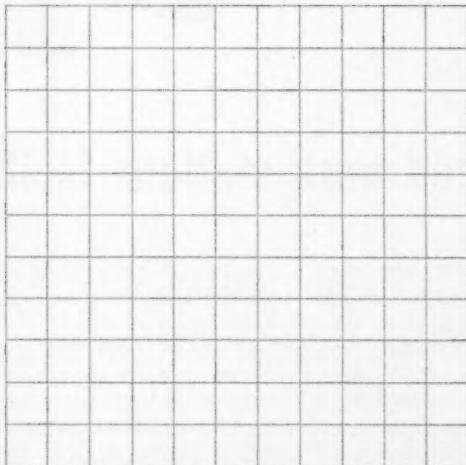
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## Official Entry Form



Use this form to make a sketch of your ROLLPIN application idea and for a brief 25 or 30 word description. If you wish you may attach a print, but it is necessary to complete this form to enter. Entries cannot be returned, and the judges' decisions will be final. Entries must be postmarked no later than July 15th, 1961 to be eligible. Winners will be notified.

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Name \_\_\_\_\_

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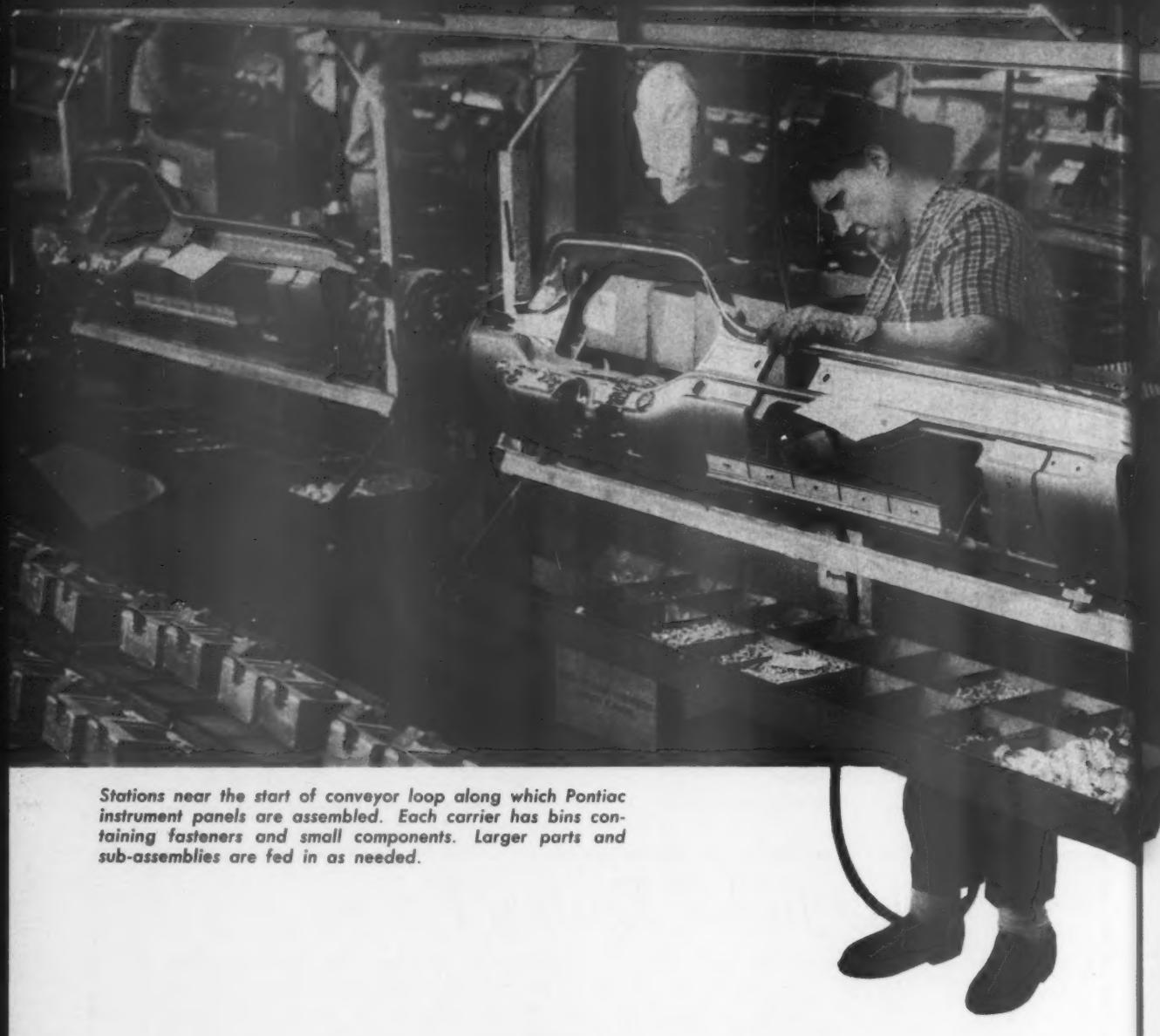


**ELASTIC STOP NUT CORPORATION OF AMERICA ROLLPIN**

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*Stations near the start of conveyor loop along which Pontiac instrument panels are assembled. Each carrier has bins containing fasteners and small components. Larger parts and sub-assemblies are fed in as needed.*

## Conveyorized work stations facilitate

Carefully-designed instrument panels plus decorative trim add greatly to the appearance of passenger cars, though relatively few people outside of automotive assembly plants have any conception as to the number of parts or the complexities involved in proper assembly and installation. Some indication of the number of parts in an instrument panel for a Pontiac are shown above at right.

Like other makers of General Motors cars, the Pontiac Motor Division, Pontiac, Michigan, pur-

chases car bodies from one of the Fisher Body Division plants. Each body is received with the basic instrument panel temporarily fastened to the body structure. This practice is followed to help insure holding certain critical body dimensions within desired dimensional limits.

Formerly, the assembly of components to the instrument panel was done without removing the panel. This necessitated working in a constricted area, between the fire wall or "dash" and the panel itself.



These components, plus many not shown, are assembled into the instrument panel. The panel proper (not shown here) is a stamping and is an integral part of car body.



by Herbert Chase, M.E.

## instrument panel assembly at Pontiac

Assembly involved considerable work in awkward positions; some operations also had to be performed blind. This slowed the work and made it difficult to avoid troubles that would necessitate subsequent repair operations.

Marked improvements have been gained by removing the instrument panel from each body and clamping each panel to one of 25 carrier fixtures that hang from a loop conveyor, portions of which appear in the accompanying photos. Below each fixture are bins containing

fasteners and other small parts. The loop conveyor traverses areas where larger components and sub-assemblies are banked within easy reach and in proper assembly sequence.

Assemblers work at convenient height and from either front or back of the panel, always able to see clearly to properly insert parts. Power drivers for screws and nuts are provided, and ample time is allowed to assure good work at each station.

Electrical elements such as

switches have to be connected to wires leading to various chassis units. They are added in the form of harnesses whose terminals must be fastened to corresponding terminals. These purchased harnesses include various plug receptacles that are subsequently connected to plugs with leads to various chassis equipment. This makes it easy to plug in or disconnect remote components.

Assemblers easily become expert in threading these harnesses into place and in attaching various leads

*continued*

as specified. By the time each panel assembly reaches the end of the conveyor, the assembly is ready to be installed in the body. Besides wires, light bulbs and fuses are put in place. At the unloading station, the completed panel is unclamped from the fixture and passed back to the body assembly line for re-installation.

Between the instrument panel and the windshield glass is a detachable cover panel that is not positioned until the instrument panel has been fastened in place and various controls are connected. By leaving this cover panel off, assemblers have ready access to the space between the firewall and the instrument panels. They are able to complete the assembly much more easily and rapidly than when access to this space was mostly from below and blind operations were necessary.

When all electrical connections have been completed, a power pack testing device is applied; electrical tests are made to see that the system is properly connected and

functions as required. This test includes checking the lights, some of which only simulate those at the remote chassis points which cannot be checked finally until the body has been mounted upon and bolted to chassis components.

The tests just described are made on bodies as they are advanced and undergo other assembly operations. Each instrument panel taken from a body near the start of this line is returned to the same body after the panel has been passed around the conveyor loop and is ready for re-installation further along the line.

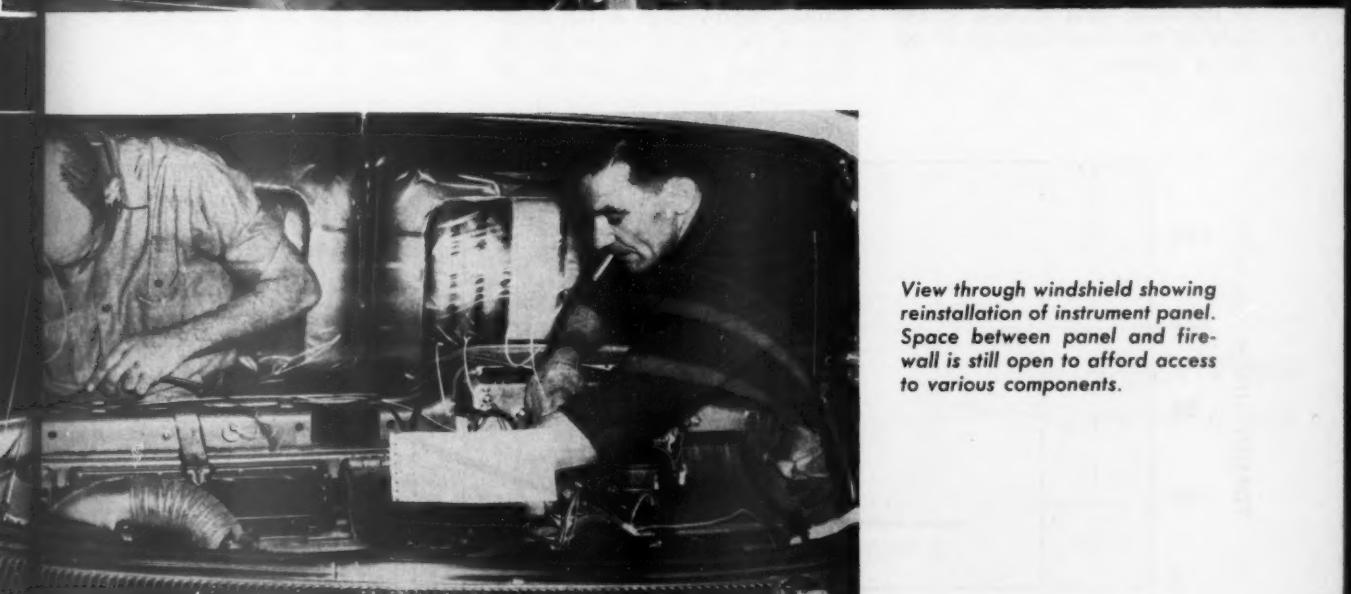
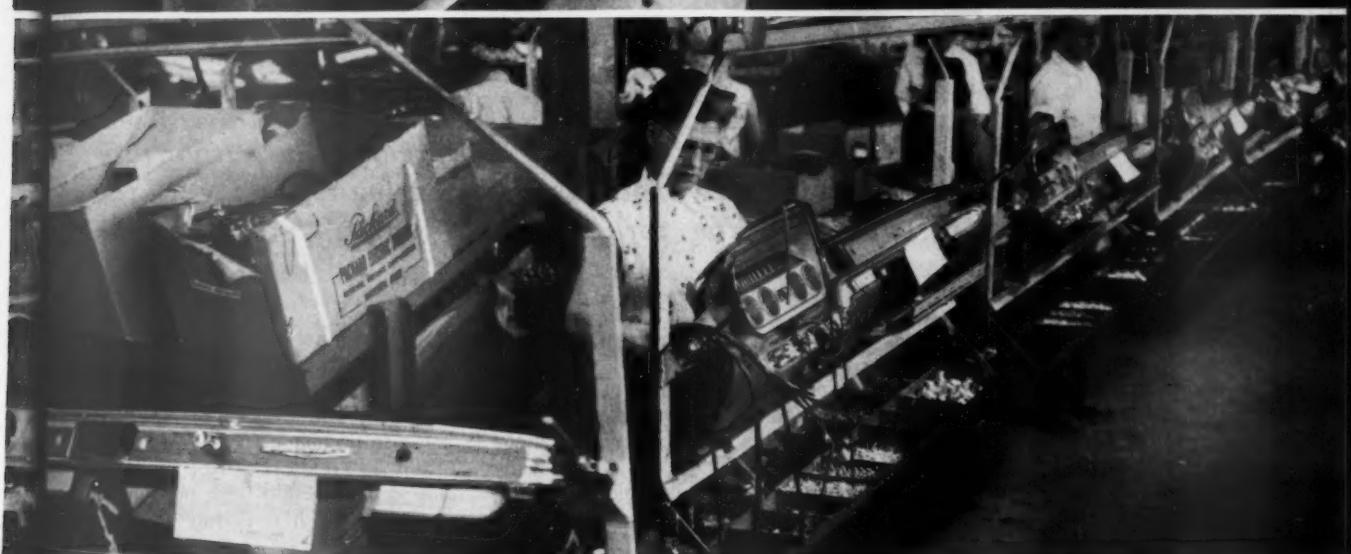
Five men are required on the body line just to remove and re-install instrument panels. These men do the work described on about 350 bodies per 8-hour shift. They have to keep pace, of course, with the chassis assembly line. In fact, each model produced has to follow a specific assembly schedule. It must pass tests and arrive at the end of the final assembly line in the specified color and with the specified equipment spelled out on a precise schedule. •

*At stations near the end of instrument panel assembly conveyor, harness sub-assemblies are threaded into place and attached to mating elements of the panel.*

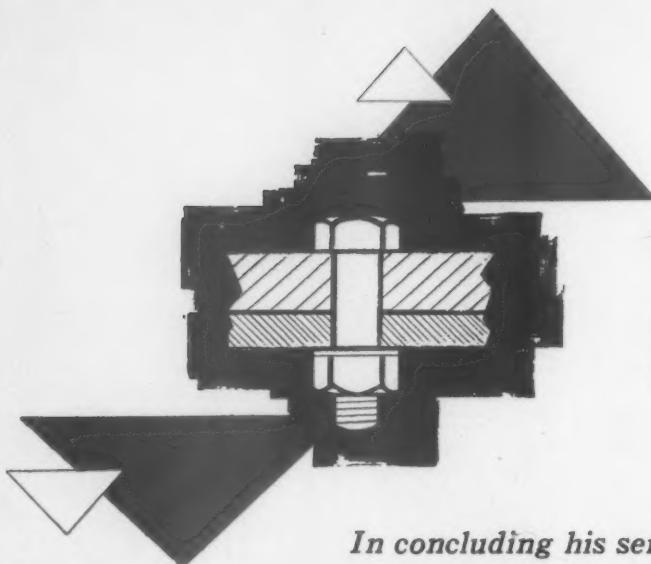
*Another view of the panel assembly line. In left foreground a carrier with completed assembly is approaching unloading station.*

*Reinstallation of Pontiac instrument panel as seen from the front. Access to space at the rear is afforded from the top as well as from below for connecting various components.*





**View through windshield showing  
reinstallation of instrument panel.  
Space between panel and fire-  
wall is still open to afford access  
to various components.**



## HOW FASTENER

by W. T. Appleberry  
Design Engineer  
Douglas Aircraft Company  
Santa Monica, California

### PART 3

*In concluding his series on bolt preload, the author proposes some new methods of measuring tension, with the hope that the torque system be gradually retired.*

The amount of initial bolt tension produced by tightening the nut is a most important factor in determining the fatigue resistance of a bolted joint.

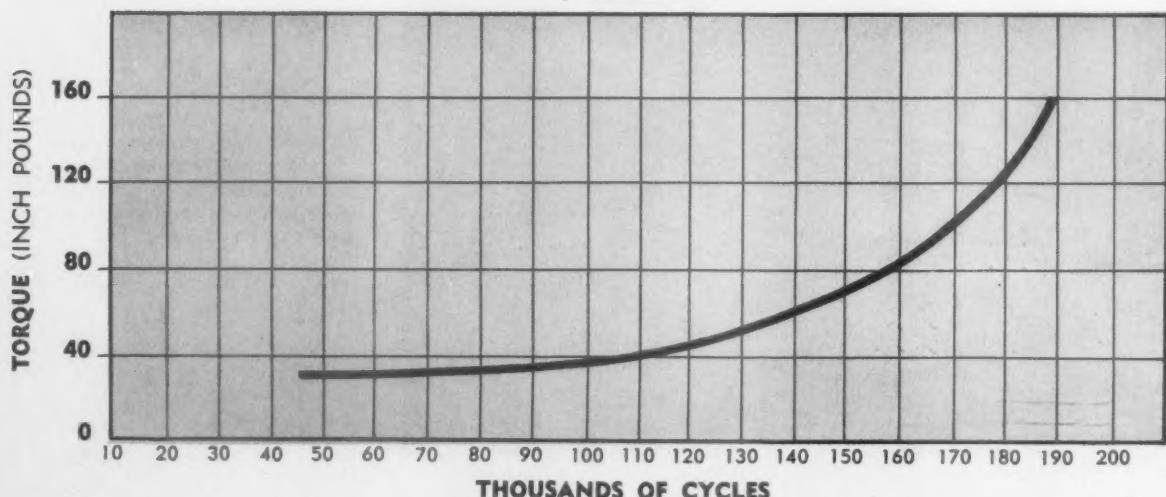
It is commonly known that in a joint where the bolt is in shear, a high preload produces sufficient friction force to add considerably to the static yield strength of the joint by preventing slippage of the faying surfaces.

It is possibly not so commonly known that perhaps the major benefit of such high preload in a shear joint is to prolong the fatigue life of the joint material. Fatigue failure in a shear joint usually begins at the bolt hole. However, with highly preloaded fasteners, tests<sup>1</sup> at Douglas have shown a substantial improvement in the resistance of the joint to fatigue failure, with failure starting outside the

hole. One-quarter (1/4) inch diameter bolts torqued to the low value of 30 inch/pounds resulted in about 45,000 cycles of joint life, but 160 inch/pounds prolonged life to 190,000 cycles (see Chart 5). These test results are in general agreement with tests run by other firms<sup>2</sup>.

Where the bolt is intended to transmit primarily tension loads through the joint, many tests and

CHART 5



# TENSION VARIES WITH EXTERNAL JOINT LOADS

more understanding are available than is the case in shear joints. Though bolt preload results in high static stresses, it decreases the amplitude of the stress cycle caused by an applied load of varying intensity, thus prolonging the fatigue life of the part. This variation in the applied load does not need to be a reversal of stress, i.e., tension-compression-tension, etc. In fact, preloaded fasteners could not normally experience a stress reversal. In such cases, fatigue arises from a variable tensile stress. The degree of variation, of course, is the amplitude of the cycle.

The preceding serves to show the importance of controlled bolt tension at installation to insure high preload.

## TORQUE AS A MEASURE OF BOLT TENSION

The most popular yardstick used by industry for determining bolt preload is "torque". It is widely known that due to differences in friction coefficients, torque and tension are related only in an approximate way. This degree of approximation itself seems to vary, there being nearly as many versions of the variation in torque-tension measurement as there are tests to determine the variation.

Whether the test comes from the torque wrench manufacturer or the fastener maker, the variation seems to lie in the 100 to 300% range. If the preload were, for instance, 40% of the yield stress in the first test and 80% in the next test, here

is a 100% variation for a given torque wrench reading. This variation can be reduced by using lubricated identical bolts in identical joints, but this is often impractical. Raymond Ei<sup>3,4</sup> states that only 10% of the torque produces tension in a bolt, the other 90% being resisted by friction. Further, he suggests that his recommended torque values be reduced "up to 50%" when using lubricated bolts, and values should be increased where rough dry surfaces are involved. The amount of increase was not specified.

Waisman<sup>5</sup> states, "To avoid excessive breakage, a normal installation torque is established so as to give the average tensile preload of 40% of the nominal yield strength of the bolt. As a result of this prac-

tice, the average preload in a bolt is far lower than is desired for strength reasons." In achieving this 40% average, there will yet be found occasional broken bolts, or, in the other extreme, loose washers. The intent of the foregoing is to show, first, that the 100 to 300% variation previously mentioned is in the right neighborhood; second, torque as a measure of tension leaves much to be desired. It is felt that by comparison with new methods the writer proposes, the torque system may one day be gradually retired.

## MECHANICAL MEASUREMENT OF BOLT PRELOAD

All the methods discussed herein measure a change in length, usually of the bolt, which in turn is a

*continued*

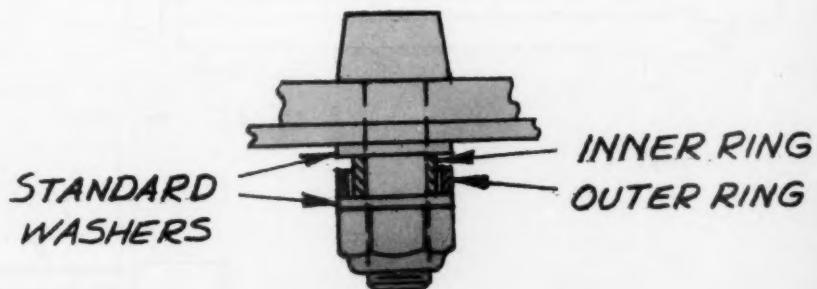


FIGURE 3

measure of bolt tension. This is based on the following relationship:

$$e = \frac{PL}{AE}$$
 where  $e$  = total elongation,  $P$  = load or force,  $L$  = length of material measured along direction of load,  $A$  = cross-sectional area, and  $E$  = Young's modulus of elasticity which for steel is about 29,500,000 pounds psi.

This shows that deformation is directly proportional to load, i.e., twice the load doubles the stretch.

1. Preload indicating washer. An assembly consisting of two concentric rings, one fitting inside the other, is shown in Figure 3. The inner ring being thicker, permits the outer ring to turn freely. But as bolt preload is increased, the inner ring deforms plastically until its thickness reaches that of the outer ring. At this point, it becomes impossible to turn the outer ring, thus indicating the correct preload has been reached. Accuracy for this device is  $\pm 10\%$  of the desired preload. This washer assembly was devised at Douglas. The method is unique in that it uses the change in length of the preload indicating washer (pli-washer) rather than that of the bolt as the index. In our further discussion, this preload indicating washer will be referred to as a pli-washer.

2. A bolt that has been on the

market for the past few years has a small shaft, concentric with the shank, that extends from the top of the bolt head into the shank about an inch. As the bolt elongates, the shaft sinks below the bolt head and this amount of depression is measured with a dial gage. The unavoidable sensitiveness of the gage did not recommend it as a production line fastener, but it should be noted that two advantages this bolt has over the pli-washer are (1) weight and (2) any change in load in the bolt can be measured at any time.

3. A relatively new fastener has been designed and developed at Douglas. It is called the pli-bolt, and has a small concentric hole running the length of the bolt. A loose fitting rod passes through the hole with short lengths of tubing crimped on either end (see Figure 4).

During bolt installation, the small tube is rotated back and forth between the fingers. As the nut is tightened, the bolt stretches until the gap is taken up completely and the tube can no longer be rotated.

After installation, the tube and rod end may be broken off, the rod removed and discarded, or it may be left intact. In the latter case, the bolt may be later removed and re-installed or checked periodically to see if joint deformation has caused reduction of preload.

The rod is brittle and will not

take a permanent set; so, if the bolt assembly is accidentally dropped, it may still be safely used. The rod may be broken for removal by firm finger pressure. The bolt has been treated with a temperature-resistant rust preventive on all surfaces including the hole.

Possible design variations on the bolt are: (a) For internal wrenching or flush bolts, the rod may be headed on one end like a nail. (b) For sealed areas, the hole need not penetrate through the entire bolt length, and if the hole depth were the same in all bolts the gap shown in Figure 5 would always be the same regardless of bolt diameter or length. In any event, the gap dimension is independent of bolt diameter but not of rod length.

Where the hole penetrates the entire bolt length, the preload device may be conveniently operated from either end of the bolt but the gap must then vary with bolt grip. If uniform gap size for all bolts is desirable a possible solution would be a combination of Figures 4 and 5 with two rods, each headed on one end in a press-fit at the bottom of the hole and with loose tubes. In Figure 4, the long hole is the most expensive part of the preload device, although the hole diameter is proportional to bolt diameter (hole area is about 6% of bolt area taken at the thread

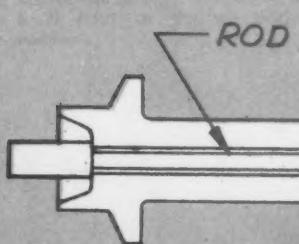


FIGURE 4

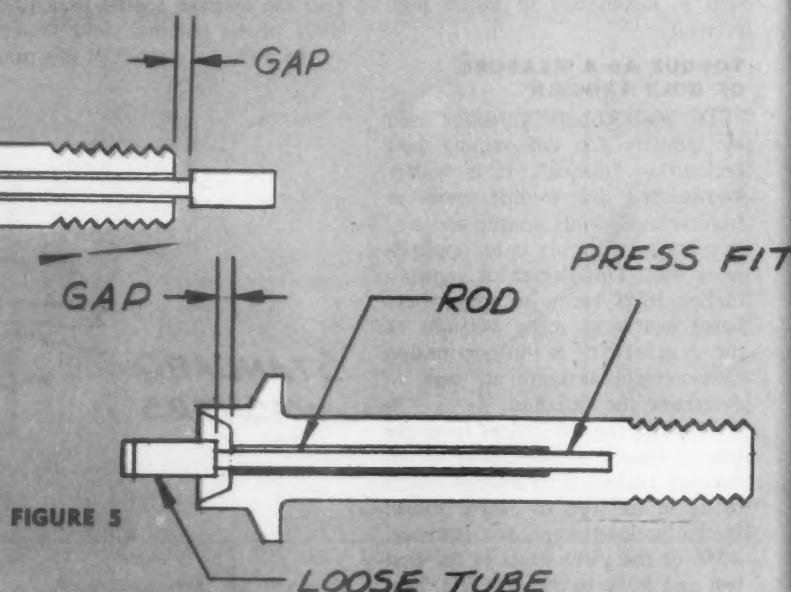


FIGURE 5

root). Uniform gap size (as in Figure 5) and correspondingly reduced hole length may prove the better solution.

Cost figures from various vendors indicate the bolt shown in Figure 4 to cost slightly more than the pli-washer but the weight premium should make up the deficit. As noted, design refinement should reduce initial cost estimates. As a further improvement in the cost comparison, pli-washers are not normally re-used. If the bolt is retightened, a new washer assembly is installed.

From a functional standpoint the comparison is as follows:

(1) The accuracy of the pli-washer is adequate. Although the pli-bolt has consistently maintained an accuracy greater than  $\pm 5\%$  of the nominal load, the larger figure of  $\pm 10\%$  would permit broader tolerances in producing the bolt assembly. The bolt shown in Figure 4 increases in accuracy with grip or in proportion to gap size, thus broadening permissible gap tolerance in larger bolts.

An estimate of gap tolerance is obtained as follows: Assume that the 8.13% deviation (see Chart 6) at .0055" gap was all on the low side of nominal and that the 9.50% at .0065" was on the high side, thus presenting the widest spread and the worst possible condition. Under this assumption, the total deviation

as the gap changes by .001" is 8.13 + 9.50, or 17.60%. This may be expressed as  $\pm 8.80\%$  deviation, and gap deviation as  $\pm .0005"$ . Since the allowable deviation is  $\pm 10\%$ , it is seen that the gap deviation may permissibly exceed  $\pm .0005"$  by a small amount. Based on a straight line relationship, the permissible gap tolerance would be  $\pm .000557"$ .

The results of tests conducted by Douglas Aircraft Company on the pli-bolt are shown in Chart 6. For a short bolt (grip length equal to twice the diameter), Test No. 4 shows an accuracy of 5% total deviation from nominal. Test No. 2 produced 3.05% accuracy for a longer bolt. The indicator gaps for all tests were hand-set by feeler gage. In Test No. 3, one specimen deviated so severely from the other six that it raised the deviation from 4.56% to 9.50%. Permissible deviation is 20%, or  $\pm 10\%$  about the nominal preload, but one sample of ten may deviate 30% or  $\pm 15\%$ .

Other tests<sup>7</sup> resulted in the following conclusions regarding the pli-bolt: (a) preloads were within 5% of the nominal load even when the indicator was set to give 100% of the yield strength; (b) repeatability of the device was excellent; (c) the device is a possible replacement for the pli-washer where

weight and space are at a premium.

(2) The preload indicating device of the pli-bolt is more readily accessible than the pli-washer where the fastener is in a counterbored hole, such as in some types of tension fittings.

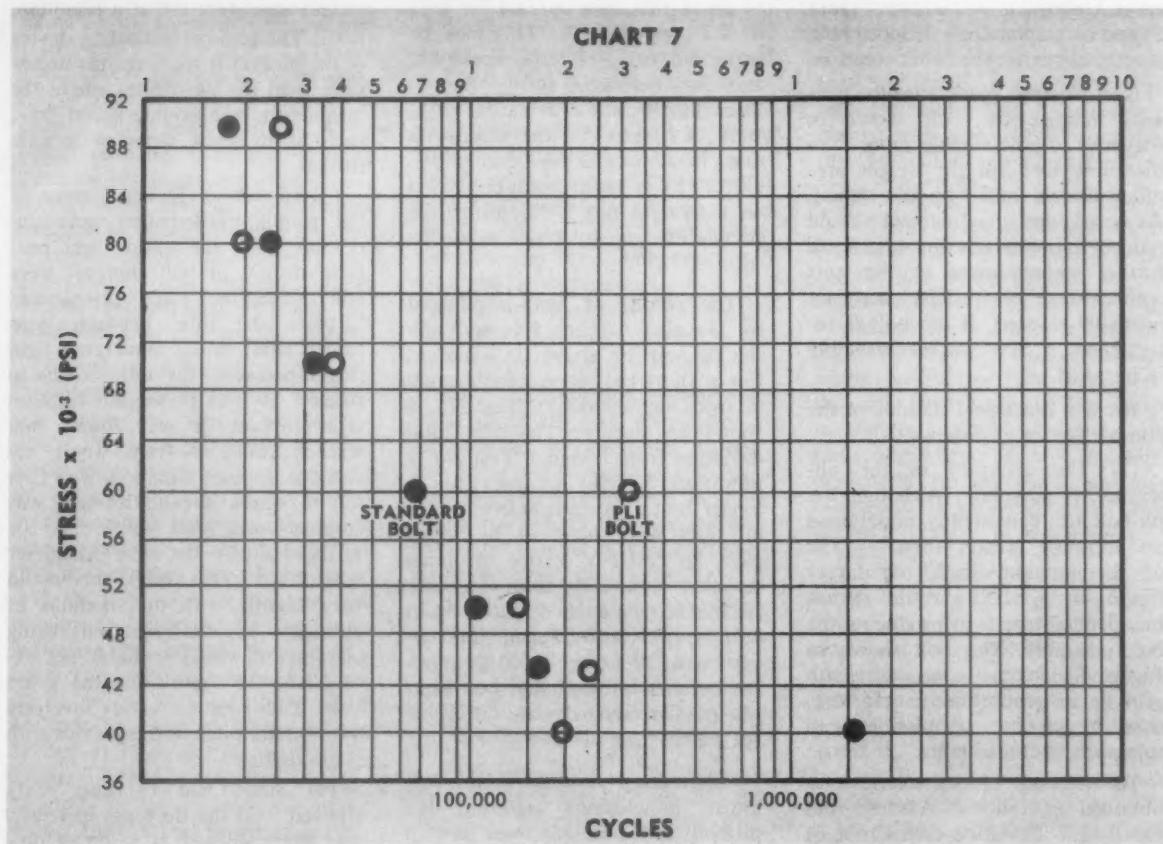
(3) In tests at Douglas, some of the people participating were unfamiliar with the nature and purpose of the pli-bolt, but all were still given the same instruction: "Rotate the tube between your fingers until, under moderately firm finger pressure, the tube ceases to rotate." At this point, nut rotation was stopped. It was found that wrench rotation—from where resistance in tube rotation was first felt to where wrench rotation was stopped—was well within 30° or 1/12 of a turn for a 1/2" diameter bolt of 1 1/2" grip. While this would vary slightly with the modulus of elasticity of the material being clamped, it would probably not exceed the 30° mark for the given bolt. This rotation varies inversely with thread pitch and increases with grip length.

(4) Static and fatigue tests showed: (a) the decrease in tensile and shear strength is in direct proportion to the decrease in cross-sectional area (about 6% at thread root); adjusting the heat treatment of the bolt would compensate for this reduction in strength. (b) The

*continued*

CHART 6

Dia.	Grip	Test No.	Total Deviation (% of nom.)	Number of Tests	Gap
1/2"	1-1/2"	1	8.13	7	.0055"
		2	3.05	4	.0060"
		3	9.50	7	.0065"
5/16"	5/8"	4	5.00	4	.0046"



fatigue life of the bolt is not affected by the core hole (see Chart 7).

#### ELECTRONIC MEASUREMENT OF BOLT PRELOAD

Like some of the mechanical methods previously mentioned, both of the electronic systems to be discussed use the change in length of the bolt as the measuring index.

A. Strain gages measure the average change in electrical resistance of tiny wires cemented to the bolt shank, usually at four places, 90° opposed. Since the gages are extremely delicate and the bolt shank must be exposed, this approach is considered of practical use only in a testing laboratory.

B. Of all preload indicating devices, the following seems to approach the closest to the ultimate; its potential appears to be enormous. No special bolt is required nor are there special washers or other devices that become part of the bolted assembly. The change in length of the bolt is measured by a sound signal emanating from a tiny transducer held against one end

of the bolt. A prototype of this device has been built and satisfactorily demonstrated through efforts initiated by Douglas.

Partial specifications are as follows: (1) Accuracy is  $\pm 5\%$  of the nominal load. (2) Bolt diameters may range from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches. (3) Controls are simple and adaptable to general shop use. One adjustment accounts for unloaded bolt length, another for desired bolt stretch, then as the preload is reached, a red light flashes. (4) Calibration is recommended once a day and takes less than thirty seconds. It is so designed that a loaded bolt can be repeatedly checked for any change in load. Without this feature, calibration is not a daily requirement. (5) Container size is  $7 \times 9 \times 12$  inches and weight is about 20 pounds.

Future developments will eventually combine transducer and wrench. However, the usual problems incident to introduction of a new product of such broad application are present, i.e., (a) Avail-

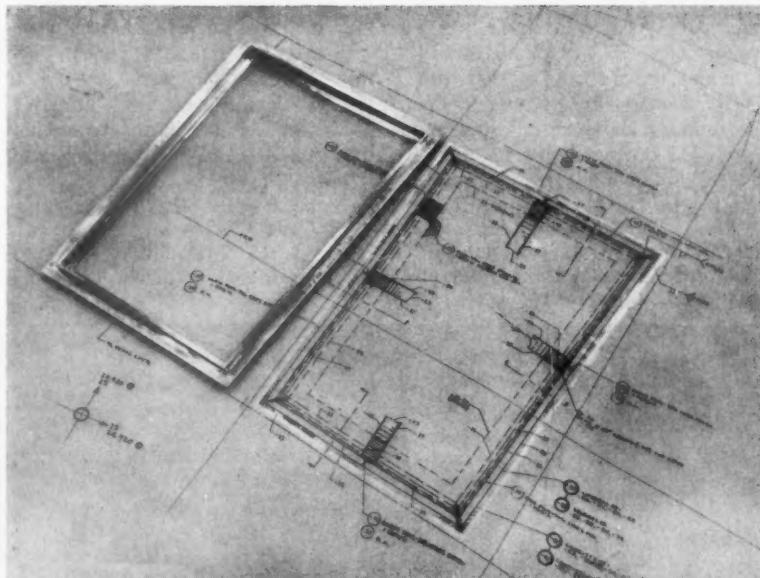
ability. If the manufacturer installs bolts in his end-products with this ultrasonic device, then the product buyer must likewise be equipped in order to accomplish maintenance or rework. (b) Both standards. The bolt must have a flat area of at least  $3/16$  inch at both ends. Many bolts already meet this requirement but some do not have this flat area at the head end. Though the change to the bolt is indeed minor, the changing of a nationally standard part is far from trivial. Bolts affected would probably require new part numbers, etc. But the gains to be made far outweigh transitory costs.

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7. SPS Laboratory report No. 183. •

*After brazing in inert atmosphere, honeycomb panels are heat-treated while still in ceramic brazing dies*

## **Producing brazed honeycomb panels for the B-70 bomber**



**A stainless honeycomb panel frame section is shown beside template drawing against which frame parts were fitted for accurate sizing. The template, made from a polyester film is preshrunk to offset .0032 inch-per-inch growth of panel during brazing and heat treating cycle.**



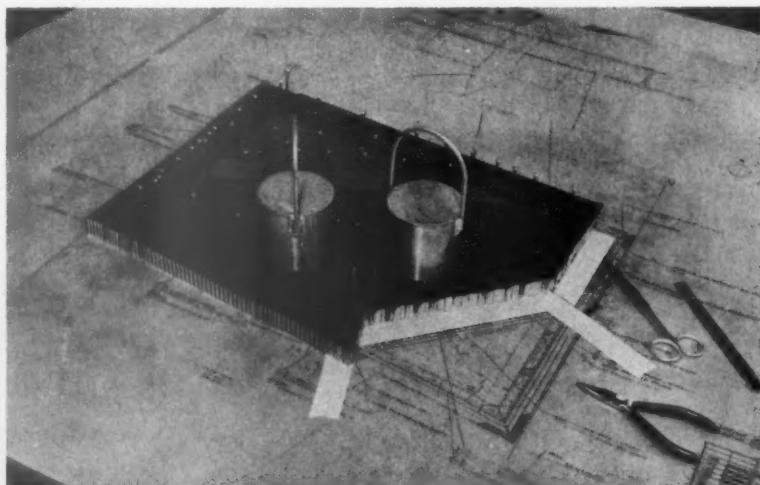
by **C. L. Pelton**  
Facilities Engineer  
Norair Division  
Northrop Corporation  
Hawthorne, California

When the Norair Division of Northrop contracted to produce brazed stainless steel honeycomb structural panels for North American Aviation's B-70 strato-bomber, it involved far more than mere modification of existing equipment and facilities to accomplish the work. Though the basic production processes to be used had been developed at North American Aviation\*, putting them into practice involved inauguration of an entirely new department at Norair under a single head so that the work could be coordinated and accomplished without depending on other factory departments. This new department had to be properly tooled, and many of the techniques employed had to be researched from scratch.

The B-70 stainless steel honeycomb panels demanded a new high in finished quality requirements, and closer tolerances than had ever been consistently accomplished in this type of work. Brazing would be accomplished in a completely inert atmosphere, and preceded by a cleaning process which would leave the panel components chemically clean. A new brazing process had to be used, and the brazed panels would be heat treated while still in the brazing dies.

With these requirements in mind, and before any production work

*continued*



**Here a spliced core section is being fitted to a duplicate of the template used in producing the frame section. The core section is spliced together from honeycomb material somewhat thicker than final requirements.**

\*See "Producing the B-70 Space Age Bomber", July 1960, Assembly & Fastener Engineering.

was started, the job of producing a panel was divided into logical steps as follows:

1. Prefit of panel frame components, and machining, cutting, splicing, and make-up of the panel core.

2. Thorough cleaning of all panel components and the accessories used in brazing, using a different cleaning process for the different materials in each job.

3. Assembly of the prefit frame members and prefit core into a steel retort or envelope which would contain them during the brazing cycle.

4. Roll seam welding the envelope edges together to produce an air-tight container for the panel parts.

5. Evacuation of the envelope to a very low level, then checking for any leaks.

6. Purging the envelope with argon gas.

7. Layup of the envelope in the brazing dies and attachment of the thermocouples for heat control.

8. Actual brazing, including various temperature cycles to accomplish complete heat treatment of the panel members before removing the panel from the dies.

Because of the tolerance and quality requirements, each panel becomes a "package job." More specifically, from the start of the prefit operations, all components which will go into a single panel remain together. Interchangeability of panel components between panels is impossible because of the large amount of hand tailoring accomplished during the prefit operations. The same panel components remain together during prefit, as-

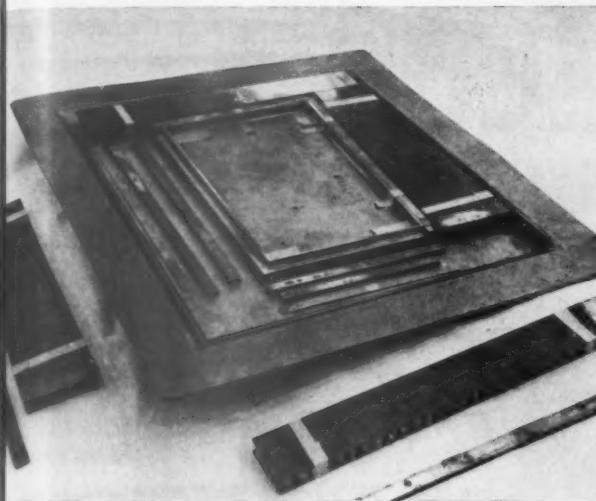
sembly, cleaning, and brazing.

Proper prefit is extremely important as the over-all length and width of the finished panel must be within 1/32-inch of drawing requirements. When combining components, cumulative errors can quickly exceed this tolerance. The panel frame components are assembled in one location, the honeycomb core material for the panel in another. Duplicate layout drawings made on transparent polyester film coordinate this work. The parts are fitted exactly to the drawings on the film, so in effect each film becomes a template tool. The film itself is preshrunk to offset the .0032-inch per inch "growth" of the panels during the combination brazing-heat treatment cycle.

After the panel frame sections have been assembled together and

*Splicing a honeycomb core section with cutouts from honeycomb of different densities. Cotter pins are used to hold spliced sections together.*



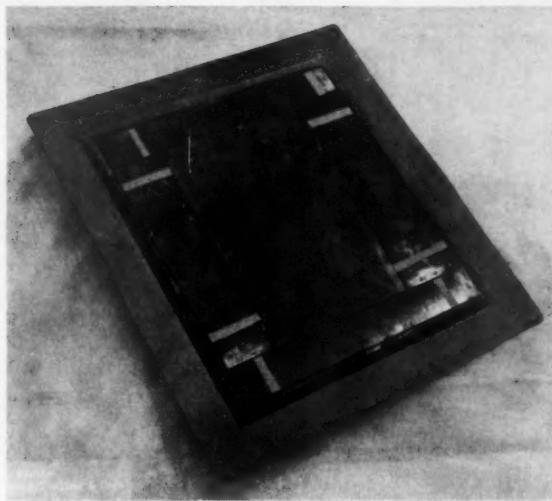


Panel frame section, heat-sink parts and halves of steel envelope have been brought together in a "package."

properly fitted, heat-sink material is added which will "fill out" all space within the steel envelope not occupied by the frame components or core material. This is necessary for even heat distribution during brazing. At the same time, this heat-sink material is carefully arranged so that it aids in holding the proper tolerances on panel edge members. An example of this is the copper filler strips used around the outside of the panel frame and fitting between the protruding "lips" of the panel cover sheets where the cover sheets extend beyond the panel frame. These copper strips are critically dimensioned and must be wrapped with a layer of .001-inch thick stainless steel foil to prevent diffusion of the copper into the stainless steel panel members during the brazing-heat treatment cycle. After wrapping with the foil, these strips "slip fit" between the protruding panel lips where they act, not only as a heat sink, but to support critical panel edge dimensions.

In prefitting the panel components, hand tailoring is used where necessary to assure a metal-to-metal fit between all faying surfaces which will be subsequently brazed. Thin copper sheets are cut to cover both sides of the assembled panel, and lay between the panel cover sheet exteriors and the envelope interior to further provide even heat distribution during brazing.

Using honeycomb material of



Here a panel, with the honeycomb core, is completely prefitted in an envelope made of 1020 mild steel.

approximate thickness, the honeycomb core of each panel is built up according to the drawing requirements.

Most of the panels require honeycomb material of different densities in the same core section, so splicing, plugging, and the insertion of odd-sized pieces in each core section is necessary. This is definitely a hand tailoring operation, with the various core section pieces cut and clamped together, then fitted against the duplicate film drawing for exact outline size. After the core sections have been made up, using stainless steel honeycomb material of approximate but excess thickness, they are ready for the final milling operation which will reduce this core section thickness to exact panel thickness requirements.

This is accomplished by electrolytic machining. Using a steam table for heat, the built-up core section is placed on a flat plate and "cast" in place with a liquid metal alloy which melts at a temperature below the boiling point of water. The "cast together" core section and flat plate is then placed in the mill and the upper surface of the core material (opposite the flat plate) is machined down to drawing requirements, holding a thickness tolerance of within .001 inch.

After this core milling operation, the prefit frame components along with the heat-sink components and envelope sections, and the machined core section, are joined and

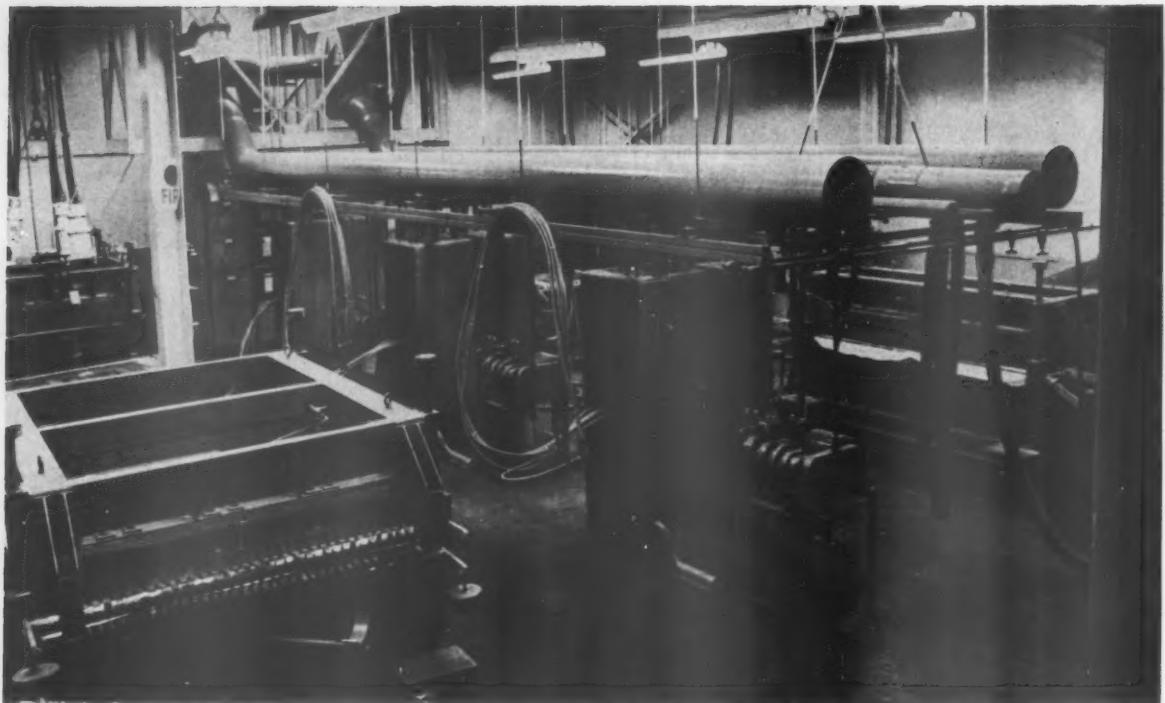
pass as a "package" into the cleaning section. This section, developed especially for cleaning the panels, contains four cleaning systems in a single line—one for the stainless steel panel components, one for the 1020 mild steel envelope sections which will finally enclose the panel, one for the copper heat-sink components, and one for the brazing alloy itself. The tanks are large enough to handle all components for the honeycomb panels up to 4 ft. by 8 ft. in size.

From the cleaning section, the "packaged" panel components go immediately into a dust-free room for final assembly prior to brazing. This, again, is a "white glove" operation. The room itself is supplied with filtered air, and is maintained at about 75° F.

In this room, the prefit frame components, the prefit core, and the prefit heat-sink materials are assembled in the formed mild steel envelope in which they will remain during the combination brazing-heat treatment cycle. The brazing alloy which is assembled in place at this time is carefully tailored to fit all faying surfaces. Immediately after the parts have been assembled between the two envelope sections, the envelope edge is joined by roll seam welding, thus forming an airtight enclosure broken only by the attachment fittings used for evacuation and purging.

After this roll seam welding operation, the enveloped part is

*continued*



General view of the Norair brazing department. At left is brazing machine with its ceramic dies closed. Units in center are used for envelope purging.

attached to a Norair-modified double-stage vacuum pump and evacuated to 20 microns. The dial gauge on this pump read directly in microns so that near perfect evacuation is assured. When a leak exists so that this degree of vacuum cannot be obtained and held, a jet of halogen gas is directed along all possible leak areas from the outside. Where the leak exists, this halogen gas will be drawn in by the envelope's vacuum and its presence in the envelope will be noted immediately on a dial gauge. The leak is then repaired.

After evacuation, the envelope is ready for final purging. Eight argon gas purges are used, one following the other, to assure that no gaseous element will remain in the envelope which might affect the metals during the brazing-heat treatment cycle. Even the moisture in the argon gas is held at or below 8 parts per million. The envelopes can be purged either before or after they are placed in the brazing dies.

#### "GLASS-BLOCK" BRAZING METHOD

What is known as the "glass block" brazing method is used. The "glass block" nomenclature derives

from the huge ceramic dies between which the envelopes are sandwiched during brazing. These dies are electrically heated. After placement of the envelope in the brazing machine, numerous thermocouples are attached which both control and monitor the temperatures used during the combination brazing-heat treatment cycle. Permanent records are produced for each job.

With the thermocouples attached, the dies are closed, and brazing and heat treatment takes place. The temperature is first raised in steps to 1730° F where it is held for 15 minutes. This melts and flows the braze metal. Next, the dies are quick-cooled by an air blower down to 1000° F. This quick cooling must be accomplished within 25 minutes, but usually a shorter time is required. At this temperature, or anywhere on down to where the dies reach room temperature (the timing is not critical), liquid nitrogen is passed through the dies to chill the enveloped panel down to -80° F. This low temperature is maintained for three hours, then both dies and part are allowed to return to room temperature. But before the dies are opened, the panel is again heat-aged

for one hour at 1075° F. These various temperature and time cycles, applied as noted, not only braze the panel, but provide proper heat treatment for the PH 15-7 MO stainless steel alloy from which both the core material and frame components are made.

With heat treatment completed, the assembled and brazed panel is removed from its envelope and receives both x-ray and ultrasonic inspection. Only then is it ready for installation on the B-70 bomber.

At least a book would be required to detail every operation that takes place in this space-age assembly process. This article is intended only to trace the course of production from initial prefitting through final brazing and inspection, and to provide a capsule idea regarding the equipment and techniques employed.

Much of the equipment and most of the techniques are unusual indeed—or "way-out" as a beatnik would describe them. But all are definite indications of production and assembly evolutions which will be necessary to keep pace with the increasing demand for space-age products!



## AIR-GUN DRIVES BRADS; ELIMINATES PRE-DRILLING OF IRONING BOARD CLIPS

A new assembly technique centered around an air-powered nailer has doubled production and cut labor requirements on sleeve ironing boards by one-third at W. F. Meyer & Son, Galien, Michigan.



First step in assembling a sleeve board is fitting holding fixture with spring clips and bracket.



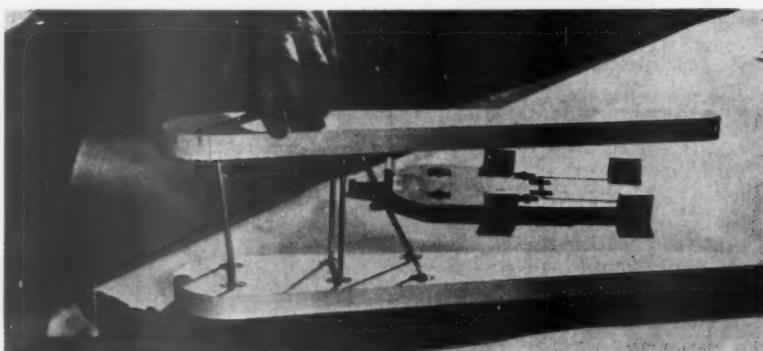
In second step the holding fixture is inverted and placed over the base board of the assembly.

Just as important, the company can now produce the sleeve boards profitably, whereas previously they were sold merely as an accessory to their main product line.

The tool that made these gains



With fixture in place and clips and brackets aligned, brads are driven through cutouts into the clips.



After top board has been fitted with spring clips in the same manner, the brackets are swung up and squeezed into the clips on the top board.

possible is a Duo-Fast brad gun. "With one gun and two fixtures," reports Verne Walls, foreman, "we can put out about 600 complete units in an eight-hour day. This is more than double the amount possible with hand-nailing."

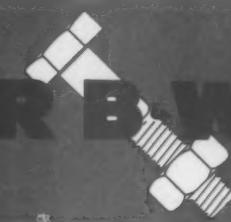
The sleeve boards consist of two nearly identical pieces of shaped wood held together by metal rod brackets. These brackets are fastened to the boards by 20 gauge spring clips. Before acquiring the brad gun, these clips were hand-nailed to the boards, with the nails driven through pre-drilled holes in the clips.

The sleeve boards are still assembled with the same components—brackets and spring clips. However, it is no longer necessary to pre-drill the clips since the gun drives  $\frac{3}{4}$ -inch long brads directly through the metal.

To assemble the boards, a holding fixture designed and built at Meyer is first fitted with the brackets and clips. After this fixture is loaded with the brackets and clips, the board is put in. This holds the parts in place while the fixture is turned over. The nose of the brad gun fits down through the holes cut out in the fixtures and the operator fires a brad into each hole, thus driving two brads into each clip.

Next, the top of the assembly is fitted with spring clips, but not brackets. The procedure is otherwise the same, and when it is completed, the brackets on the base are swung up and fitted into place in the clips on the top board.

"Material costs are about the same," says Walls. "Although the brads cost slightly more than the nails previously used, this cost is offset by the fact that we can use blank clips instead of pre-drilled clips."



# RB&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



## Technical-ities

By Fred E. Graves

### Fastening of rigid joints

Theoretically, there's no such thing as a rigid joint. There's always some elasticity of the fastened metals. For practical purposes, you can consider a joint rigid when the bearing areas of the metal-to-metal fastened members will not crush or yield before the full load-carrying capacity of screw or bolt is developed.

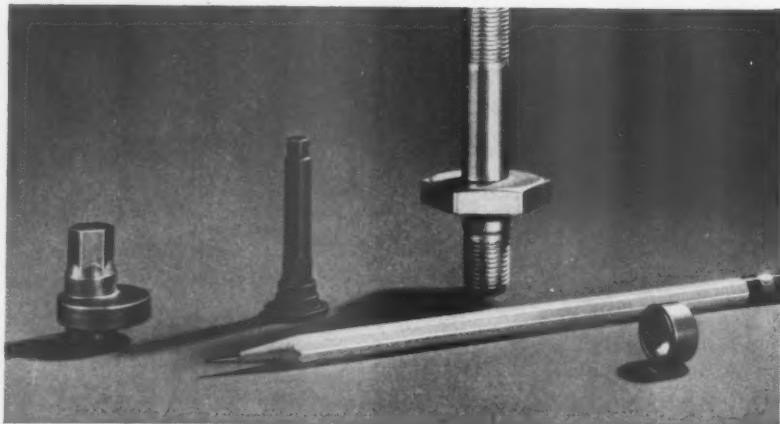
#### PRODUCT BENEFITS

Rigid joints afford a definite product advantage. They can take high strength hex screws or bolts tightened up to fastener yield strength or beyond. Under such tension, fasteners have demonstrated that they'll stay tight despite vibration. They are resistant to fatigue from the constant load reversals. High Strength Hex Screws cut costs and speed assembly too, since you can reduce size of the fasteners or their number, while actually improving joint strength.

#### INSTALLATION HINTS

When you're connecting steel members of fairly heavy section, you've no problem getting a rigid joint. Just clamp them to the full fastener capacity. Thin sections can be reinforced and similarly fastened. And in joining milder steels or softer metals, use of a plate washer will distribute bolt load, prevent crushing and give the desired effect of rigidity.

## When to plan on cold-formed special parts



COLD forming is basically a large volume, low cost method of obtaining component parts.

Above you see four specific types of parts that benefit from this production method:

#### ECCENTRIC SHAPES

When the piece is radically eccentric, and is further complicated by having several different diameters, cold forming may prove the only way to produce the piece at a reasonable cost. Machining it from a bar would be prohibitive in scrap loss and machining time.

#### MULTI-DIMENSIONAL DESIGNS

When pieces are complicated, cold formers can often shape item in two or three blows. Tolerances are close enough for practical uses, and no further finishing need be done except for some secondary machining or drilling if required by the design.

#### ONE-PIECE PARTS

When simple, small two- or three-piece assemblies can be replaced with unit parts, the production man saves assembly time as well as mate-

rial costs; the designer gets a stronger part. For example: stud with integral hex, square, or round upset anywhere in-between. Note the extreme upset shown.

#### PARTS WITH HOLES

Nut formers produce parts by the thousands per hour like the one shown above. Holes are punched out, leaving smooth, clean, work-hardened and strengthened surfaces.

Bear in mind that unlike machining, cold forming cuts none of the metal's flow lines. So parts are tougher and more fatigue-resistant, as well as more economical.

As a fastener manufacturer, RB&W makes an ideal and experienced source of supply for such items. The same facilities used for standard screws and nuts can also pound out the required specials. Refer your problem to Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.

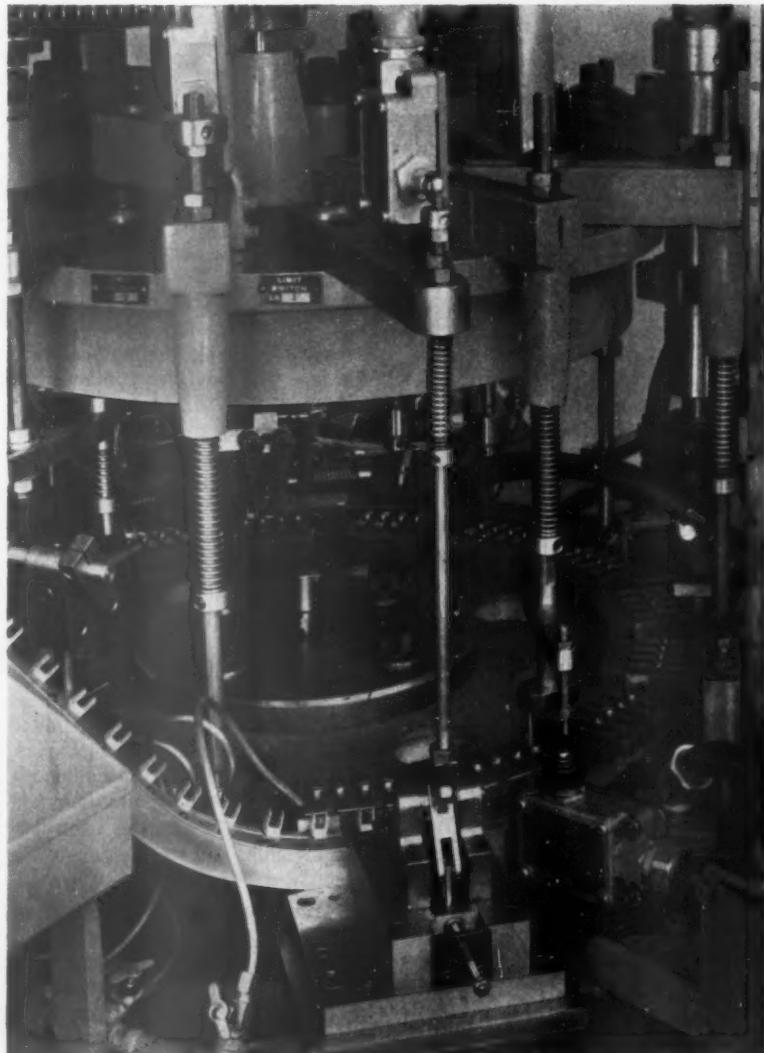
Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Sales office and warehouse at: San Francisco, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas.

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# AUTOMATIC ASSEMBLY OF RELAY TERMINALS



*By automating the assembly of contact terminals for new series of air-conditioner relays, M-H was able to cut cost of terminals 80%.*



Sequence of operations for assembly machine: stamping is fed down track at left, then (counterclockwise) transfer of stamping to dial table; inspection to see that part is present; transfer of contact over stamping and weld; tap hole for binder screw; insert screw; automatic ejection of assembled terminal.

by R. S. Mueller, Process Engineer  
Minneapolis-Honeywell Regulator Co.  
Minneapolis, Minnesota

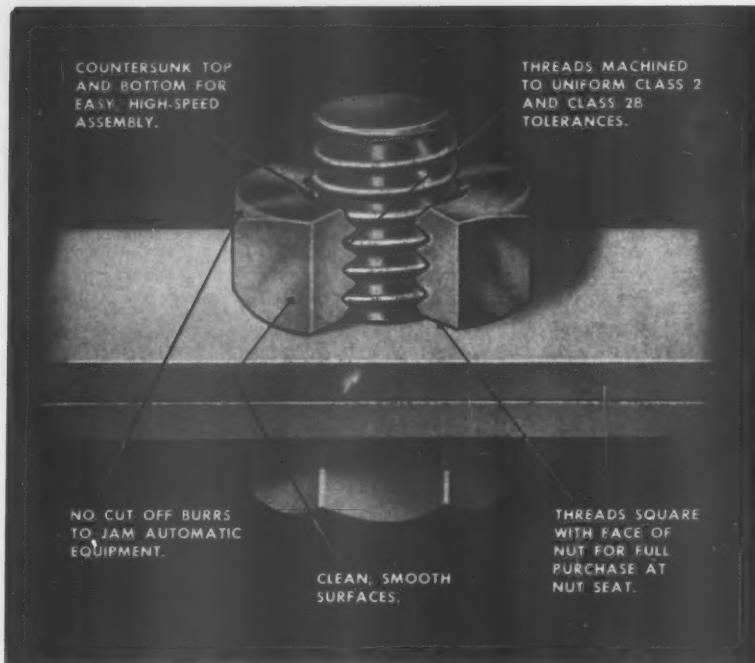
When designing the contact terminals for our new R8100 series relays (for two and three-ton air conditioning units), we decided to go to a welded bi-metallic tape for the contact surfaces. Replacing the traditional rivet-type contacts, this tape offered a substantial cost reduction as well as reduced maintenance in field servicing.

With an eye toward further cost reduction, we investigated the possibilities of automating the contact terminal assembly operation. For this job, an assembly machine had to take either right or left-hand terminals, position and weld the silver contact, tap the terminal, insert a binding-head screw, check for missing or improperly positioned screws, and automatically eject and sort out any defective assemblies. Working to our specifications Bodine assembly engineers built such a machine which has enabled us to cut the cost of these terminals by 80%.

Here is how the assembly machine works. Parts are fed through a track which permits the operator to feed at any convenient time. This track is manually fed, but can be adapted to hopper feeding whenever desired. Like the track, the machine's dial fixture is designed to accept right or left-hand contacts.

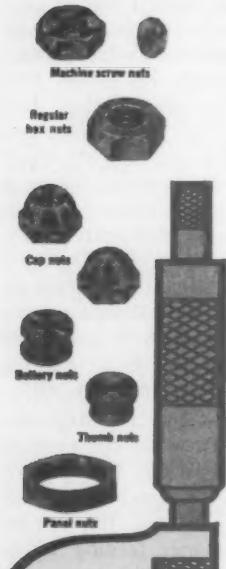
After automatic inspection to insure the presence of a stamping, the silver contact tape is positioned over the stamping and welded in place. The welding is accomplished

*continued*



## CORNELL

### "Machined from the Bar" BRASS NUTS REDUCE ASSEMBLY COSTS



"Machined from the Bar" brass nuts can save you countless production dollars yearly by speeding your assembly operations and reducing downtime and rejects to a minimum. These precision nuts handle easily, spin on smoothly, tighten securely and, once in place, stay in place.

We are specialists in "Machined from the Bar" brass nuts. This is our only product. Our method of manufacture assures that every nut is a precision product held to close tolerances and checked with go and no-go gauges. This uniformity speeds hand operations and permits trouble-free performance of portable and hopper-fed, high-speed nut setters.

Remember, "Machined from the Bar" brass nuts are available at no extra cost. Standards are available "off the shelf", shipped the same day the order is received.

Call, wire or write today: Gene Carroll, Yonkers 8-9400. Teletype, Yonkers 4358.

Remember . . . "Machined from the Bar" at no extra cost!

# CORNELL

MANUFACTURING COMPANY, INC.

12 SAW MILL RIVER ROAD, YONKERS, NEW YORK

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### Automatic Assembly, continued

with a standard 50 kva unit. Actuation of the electrodes is done from the main machine control station. (Soon after the machine was placed in operation, we found that the use of a molybdenum-faced lower electrode permitted runs of 10 to 15 thousand welds per electrode. This is about ten times the life of the copper electrodes previously used.)

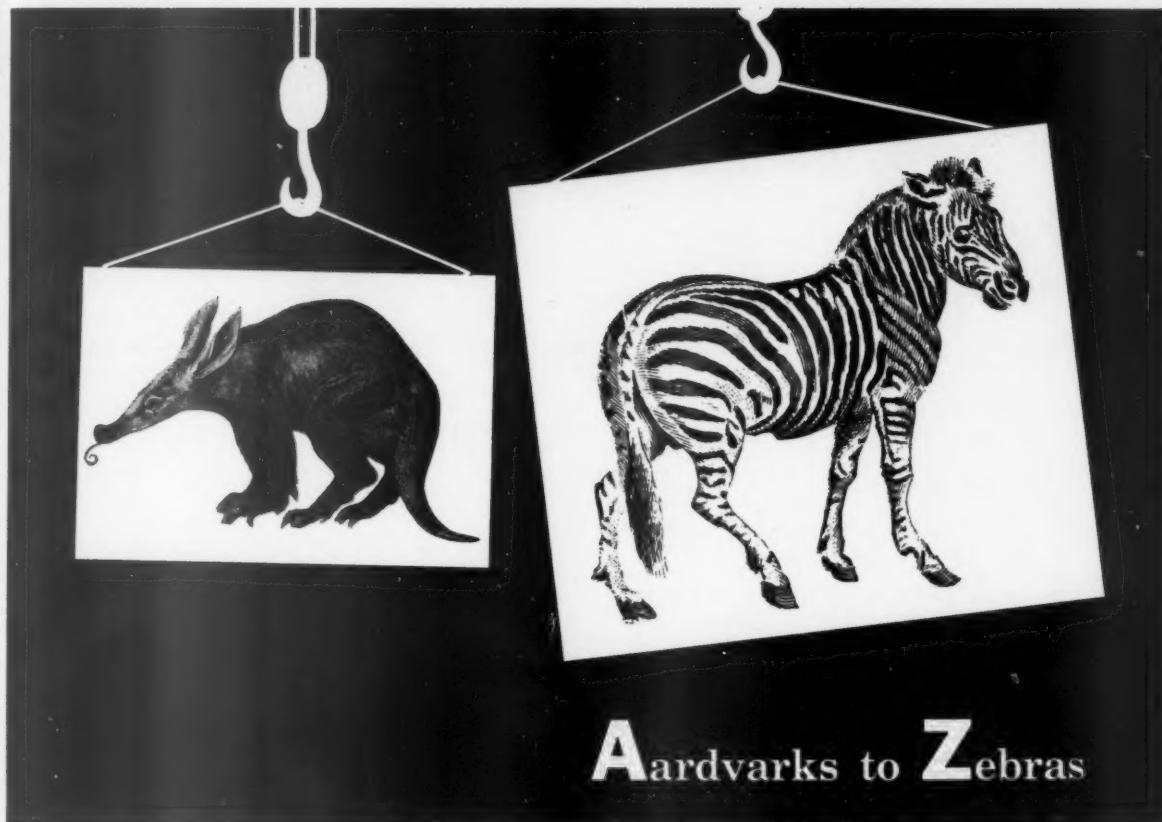
One of the problems encountered in the design of this machine was the feeding, orienting and positioning of the contact tape before and during the welding process. The initial concept was to feed the tape through a blanking die and directly from the press into the machine. As the design progressed, it was found preferable to separate the die from the assembly machine.

This separation prevents shutting down the assembly unit because of press maintenance, changing of stock reels, etc. Another reason for separating the press from the assembly machine was that the crown of the tape, when placed on the contact, had to run 90° from the direction at which the tape left the stock reel. An independent press unit was designed to blank the contacts from the tape and feed the contacts into a magazine. When the magazine is full, the press shuts off automatically. Full magazines are placed in the assembly machine in the proper position for transferring the contact over the stamping.

After the machine cycles for the welding operation, the part is inspected for the presence of the contact. Successive stations tap and insert screws in the terminal, after which the part is ejected.

Tooling for this job is mounted on a standard Bodine machine chassis. The machine is mechanically actuated, with all the motions controlled from a central camshaft. The machine runs at a rate of 40 cycles per minute.

Combining the welding, tapping and screw inserting operations, together with automatic feeding of the tape, reduced the cost of assembly operations on this relay part from \$38.10 per thousand to \$5.10 per thousand. The machine averages 10 to 12 thousand parts a shift, including time for inspection, maintenance, magazine changes, etc.



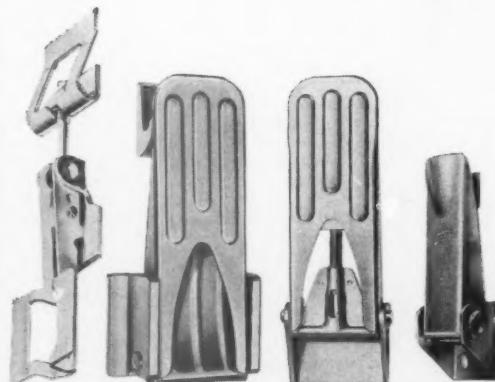
## Aardvarks to Zebras

There's a Camloc Fasten/eered Universal Latch to do the job... and do it better!

You may never have to crate an anteater or ship a zebra. It's just one way of demonstrating the wide range of tensile strength requirements met by Camloc Universal Latches. For any job... from A to Z... 500 pounds or 4500 pounds... shipping containers or component assemblies of any size... Camloc can provide the latch to fill your specifications.

At Camloc the science of modern fastening is called FASTEN/ATION. And, FASTEN/EERED Camloc latches provide the ultimate in protection, ease of installation, and simplicity of operation. For example: draw hooks always stow flat when latches are open. Latches can't open under shock or vibration. Clean, crisp appearance enhances any product or component.

Have a special fastening or closure problem (even a reusable zebra case)? Camloc can provide a FASTEN/ATING solution. Write today for your copy of the full-line Camloc catalog. *specialists in fasteners for industry*



37L — Ultimate tensile strength up to 4500 lbs. Short or long handle types.

46L — Ultimate tensile strength up to 2000 lbs. Aluminum or steel mounting bases and hooks.

46L (with adjustable draw hook) — All the features of type 46L plus draw hook adjustable over a  $\frac{1}{2}$ " range.

51L — Ultimate tensile strength up to 500 lbs. Hook adjusts by simple rotation over a  $\frac{1}{4}$ " range.

CAMLOC FASTENER CORPORATION, 14 SPRING VALLEY RD., PARAMUS, N. J.

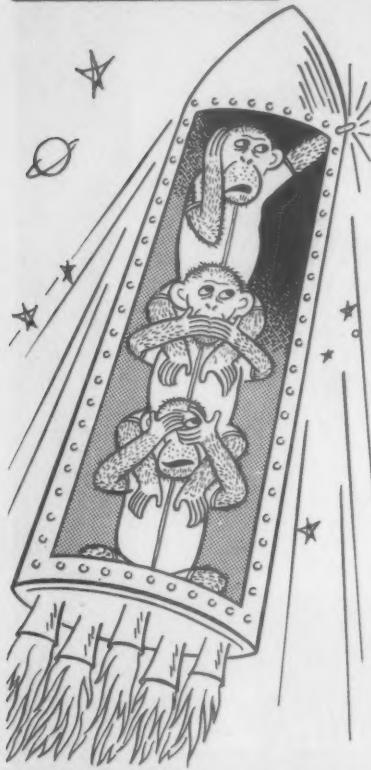
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## AS RUDY SEES IT



Got a question, challenge, puzzle to share or story to tell? Shoot it along, we'd like to meet you.

### RESEARCH DOES IT AGAIN

Research is the backbone of scientific advancement. It is through research that we can equate observable phenomena and point the way to future action. The latest equitable fact comes from researchers at Reynolds Metals, where they have concluded that there are about 25 million insects per square mile of the earth's surface. Our advice: "Avoid picnics", or as we said several months ago "Be bug-wiser".

### THE TRUE TEST

Split-ups among young married couples should never be taken seriously until it has been determined whether the husband has walked out carrying his bowling ball.

### WONDER WHERE THE TWINKLE WENT

When one of our nation's prominent steel companies elected a new president recently, a news release described him as a man with "a twinkle in (his) bluish-gray eyes." Noting that United States imports of bolts, nuts and rivets were about three and a half times greater than our exports of the same items, we can't help but hope those twinkly bluish-gray eyes have turned steely.

### DEFINITION

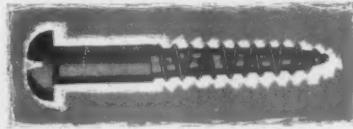
Trouble Free—Only the repairs cost money.

### MATH OVER LIGHTLY

A gambler devised a game to be played with a friend. He bet half the money in his pocket on the toss of a coin; heads he won, tails he lost. The coin was tossed and the money handed over. The offer was repeated and the game continued. Each time the bet was for half the money then in his possession. Eventually the number of times he lost was equal to the number of times he won. Quickly now! Did he gain, lose, or break even? (answer on page 76)

—Pacific Electronics Monthly

### SCREW WITH COMBINATION THREAD



The engineers at Dumont Industrial Screw have presented their latest fastener for high production assembly. It is a screw with a combination thread. This new thread solves a lot of problems in the industry. First, it saves time in ordering. You don't have to specify right or left-hand thread because this screw has both. The big benefit is in production. A right-hand thread inserts when turned right and removes when turned left, while a left-hand thread inserts when turned left and removes when turned right. You don't have to remember all these complicated technicalities when using the combination thread. The screw can be turned in either direction to insert or remove. No time is lost in stopping to think or in changing direction.

### NOW WE KNOW . . .

From Sam Petok of Chrysler Motors comes information which sheds light on those cars which have been designed with the "forward look". According to Plymouth designers and engineers, planning a new model is like love-making among the elephants. There is a lot of trumpeting, everything of significance transpires at a high level, and nothing comes of it for three years.

### LIMERICK CORNER

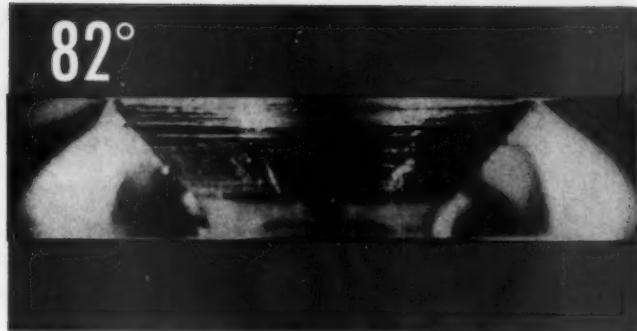
Some words preeve science writer—Greif-Assoc. There once was a writer, pedantic, Given to thoughts, all semantic. "There are some words," he stated, "That are grossly out-dated. And their use makes me really quite frantic."

... when we have seen one hard and heavy fastener... Ralph Waldo Emerson.

# PQA\*

## proves it...

**this Allen  
Flat Head  
Cap Screw has  
complete  
all-around  
head contact**



PQA makes it certain that an Allen Flat Head Cap Screw has contact throughout the angle of the head with the mating countersunk hole. This assures the strongest possible fastening. In this photo, made with polarized light, you can see the stress points throughout the chamfer.



Industry standards allow a tolerance of  $+2^\circ$  in the head angle. Allen Flat Heads manufactured to this tolerance have greater bearing at the top of the head—shown by the stress patterns in this polarized light photograph.

## \*PRODUCT QUALITY ASSURANCE

# ALLEN

MANUFACTURING COMPANY  
HARTFORD 1, CONNECTICUT, U.S.A.

Plant at Bloomfield, Connecticut  
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Genuine ALLEN products are available only through your ALLEN Distributor. He maintains complete stocks close by to help cut your freight costs, inventory, warehousing and handling. He offers fast, single-source service. He knows ALLEN products. And he makes ALLEN Engineering Service available to you any time. Call him!

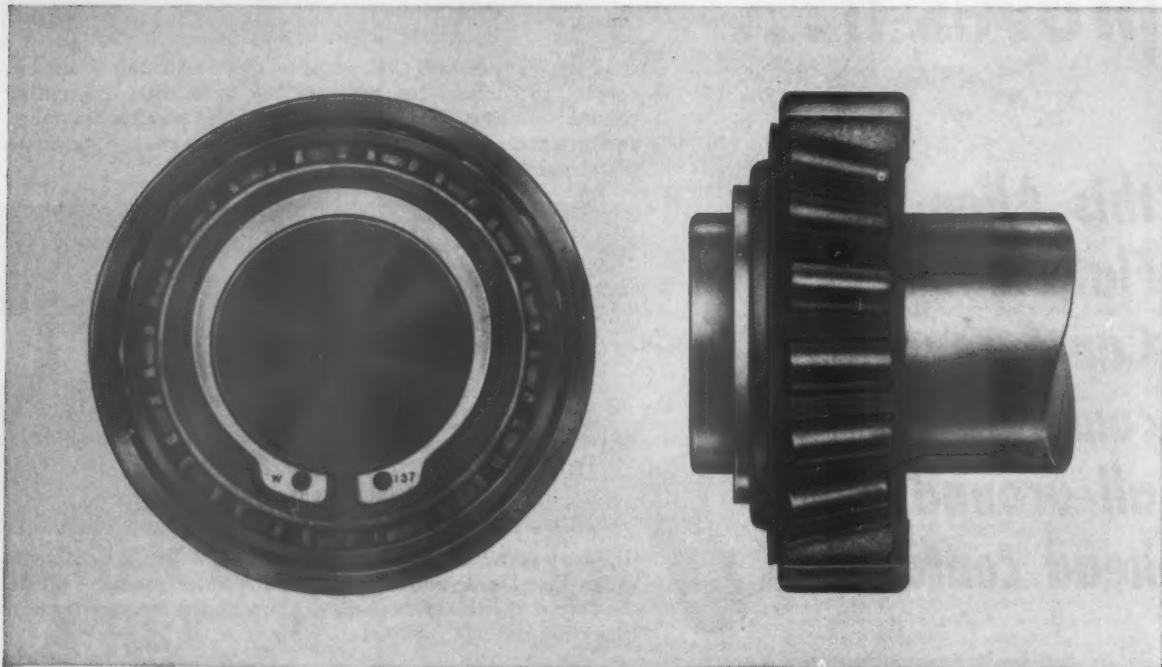


Industry also allows a tolerance of  $-2^\circ$  in the head angle. *But Allen does not utilize this negative tolerance.* The reason—it is entirely possible to have head seating efficiency reduced because of excessive interference in the head-shank area. The photo shows high bearing stress in this area—with risk of breaking prematurely.

**PRODUCT QUALITY ASSURANCE** is the symbol of unquestioned quality at ALLEN. It stands for constant quality control every step of the way—your guarantee of quality and reliability.

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# NEW! Waldes TRUARC Series 5160 Heavy-Duty Retaining Ring



**for thrust and impact...for retaining bearings  
...for a new approach to heavy-duty fastening**

Now you can enjoy the benefits of a truly heavy-duty fastener — with all of the advantages and production economies retaining rings provide. The new Truarc Series 5160 is a unique external ring designed to secure components on shafts, axles and similar structural members. It has high thrust load and impact resistance and forms a shoulder sufficiently high to retain parts having large corner radii or chamfers. The Series 5160 is ideal for retaining bearings. You can use it *without spacer washers* to secure ball bearings, tapered roller bearings (shown above) and cylindrical roller bearings — all having large corner breakouts. The ring eliminates the need for machined shoulders, costly heavy-duty nuts

and other bulkier and more expensive fastening devices normally required for extreme loading conditions. The Truarc Series 5160 is available in 11 popular sizes for shafts ranging from .473" to 2.0" dia. — and other sizes are on the way. You can order the Series 5160 in carbon spring steel or — for corrosion resistance and high temperature limits — in Armco PH 15-7 Mo stainless steel. Sizes up to 1.378" also are available in beryllium copper. For complete specifications, write for Truarc Data Bulletin No. 459-11. Better yet, contact your local Truarc Representative or Distributor. They're listed in the Classified Telephone Directory under "Retaining Rings" or "Rings, Retaining."

**SEE FOR YOURSELF** — Send for a free sample of the Truarc Series 5160 Heavy-Duty ring. We'll include a standard external ring of the same size for comparison. You'll see the difference as soon as you open the envelope.

**WALDES KOHINOOR, INC.**

47-16 Austel Place, Long Island City 1, New York

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48

Assembly & Fastener Engineering



## WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 60. Just circle the number on the card matching the number following the description. We'll do the rest.

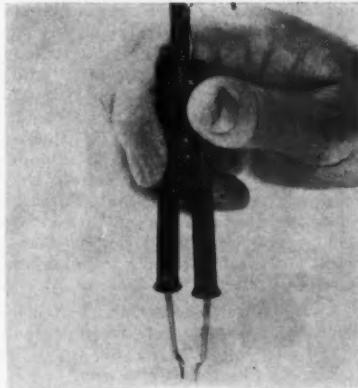
### TWEEZER SOLDERING TOOL FOR MINIATURE CIRCUITS

A tweezers soldering instrument for production soldering of microminiature semiconductors has separate heating elements in each arm, which develop 572°F temperature at the 1/32" tips. The tool is designed for use with low temperature solders to protect diodes, transistors and bi-metals. The tweezers can be used to position and hold the work rigidly while soldering, and allows the operator an unobstructed view at all times. Both sides of a circuit module can be heated simultaneously, to eliminate cold joints and reduce heating time to a minimum.

Weighing one ounce, the instrument is six inches long and operates on six volts dc. The low voltage eliminates shock hazard to the operator and eliminates handle heat.

Oryx Co., 13804 Ventura Blvd., Sherman Oaks, Calif.

Use postpaid card. Circle No. 1



See No. 1

the other a torque range of 2 to 30 in/lbs.

Also available with the kit is a complete set of adapters for driving regular hex nuts, socket head screws, regular screws and Phillips type screws.

Hunter Torque Controls, R. N. Hunter Sales Co., 9851 Alburtus Ave., Santa Fe Springs, Calif.

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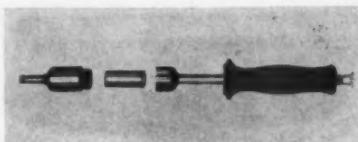
### COMPACT BALANCER REEL FOR SMALL POWER TOOLS

Two new small sizes of portable tool balancers have load capacities from 0-2 lbs and 0-4 lbs.

Used for suspending small power tools such as screwdrivers, and nut setter drills on production and high speed assembly lines, the "A" series balancers have an over-all dimension of 4" diameter and are 1 1/8" wide.

Aero-Motive Manufacturing Co., 1803 Alcott St., Kalamazoo, Mich.

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See No. 2

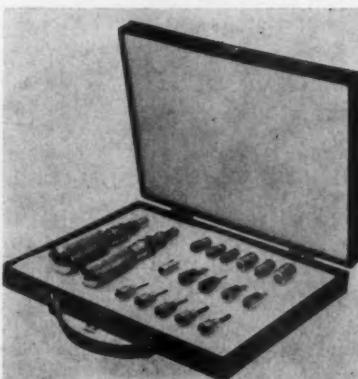
### SOLDERING TOOL NEEDS NO FLAME OR ELECTRICITY

A new soldering tool which requires no flame, electricity or external heat of any kind, heats itself by a tiny cartridge located in the tip of the tool. The cartridge is actuated by simply releasing a spring rod in the handle. Within seconds the tip heats up to 862°F. and the tool is ready to use.

The Hotspot can be used anywhere, out in the field or in the plant. There is no need to carry around flame-heat-ing devices or extension cords.

Standard Automation Products, 1738 Ridgeway Rd., Havertown, Pa.

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See No. 3

### TORQUE SCREWDRIVER KIT HAS WIDE RANGE

A torque screwdriver kit features two micrometer adjustable torque screwdrivers. One driver offers a torque range from 4 to 100 in/oz, and

### VIBRATORY FEEDER HAS 6 TONS PER HOUR CAPACITY

A light capacity vibratory feeder, has a normal rated capacity of six tons per hour.

The model F-152 is of the electro-magnetic type, producing 3600 vibrations per minute from rectified half-wave ac. It can be fitted with various sizes of flat pan or tubular troughs, either of carbon or stainless steel.

Syntron Co., 820 Lexington Ave., Homer City, Pa.

Use postpaid card. Circle No. 5

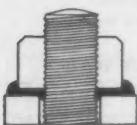
### SHAFT DRIVEN COUNTER HAS INTEGRAL PUSHBUTTON

The series 312 Atcotrol shaft-driven revolution counter provides dependable electrical control for machine or process equipment operation. The counter can be directly coupled to a rotating shaft and may be driven at any speed, constant or variable, up to 2000 rpm with

This new lock and seal washer is just plain **REVOLUTIONARY...**



### NYLOGRIP Dubo Lockwasher locks and seals it-instantly!



The new NYLOGRIP Dubo Lockwasher is made of a special, cold-flow plastic called Nylon 6. When the nut is tightened, the washer "flows" — its inner diameter grips into the threads of the nut and bolt, to seal this junction against leakage, while the outer

diameter flows over the outer edges of the nut, seals and locks it... so tight neither shock nor vibration can budge it! The Dubo Lockwasher can be used time and again without the slightest loss of holding power. And, because it's symmetrical and has no threaded parts, you couldn't fit one incorrectly if you tried.

**PLUS FEATURES:** excellent electrical properties... exceptional wear resistance... good shock absorption... resists corrosion, chemicals... non-flammable... high flexural strength.

**PLUS USES:** The excellent electrical characteristics of NYLOGRIP Dubo Lockwashers make them ideal for electrical insulation, or to help control electrolytic corrosion between dissimilar metals.

YOU'LL WANT COMPLETE TECHNICAL INFORMATION.

Write today to:

**NYLOGRIP PRODUCTS**  
366 Watertown St., Newton, Mass. BI 4-0960  
Non Metallic Fastenings of all types.

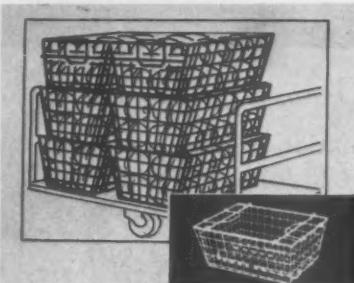
Use postpaid card. Circle No. 230

repeat count accuracy  $\frac{1}{4}$  of 1% of dial range. It is available in 11 standard dial ranges from 0-12 to 0-6000 revolutions. Special ranges are available also.

Automatic Timing & Controls, Inc., King of Prussia, Pa.

Use postpaid card. Circle No. 6

### SELF-STACKING BASKETS FOR ASSEMBLY LINES



A self-stacking wire basket system for general manufacturing and storage, has cut time and labor costs in many general manufacturing and distributing operations. Used adjacent to assembly lines, the self-stacking baskets can be loaded with finished products, stacked on dollies, and transported to shipping areas or to storage areas where they can be removed as needed. No large space requirements are needed to store empty baskets as they can be nested within each other to take up minimum storage space.

Abbey Wire Works, Inc., Industrial Division, Collins and Westmoreland Sts., Philadelphia 34, Pa.

Use postpaid card. Circle No. 7

### AUTOMATIC WELDING HEAD FOR DRY BOX USE



A precision welding head is designed for automated production of subminiature devices such as transistors, diodes and other minute electronic components.

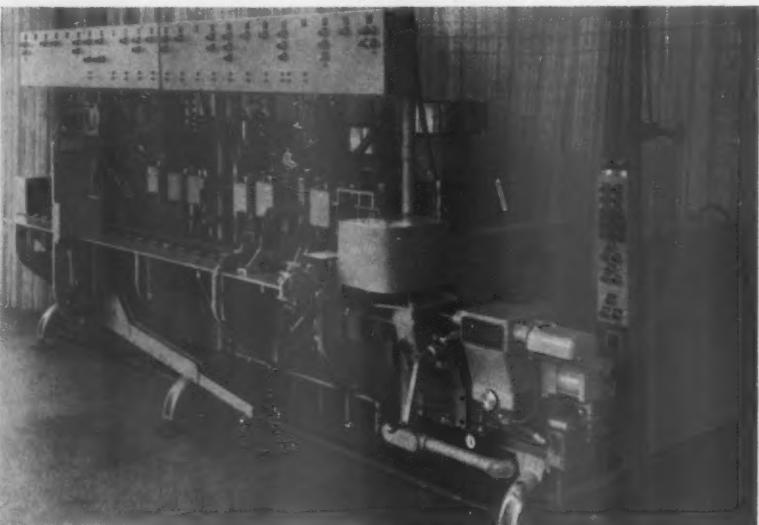
Compact for installation in a standard "dry box," the Raytheon automated "M" Head has precise welding control, provided by an electric timer which can be remotely located. Welding action can be initiated by automatic programming or adapted to dial feed for high production rates.

A cushion feature in the air chamber protects the work, and higher production rates have been made possible with dual-action cylinders.

William Buck, Commercial Apparatus and Systems Div., Raytheon Co., 1415 Providence Turnpike, Norwood, Mass.

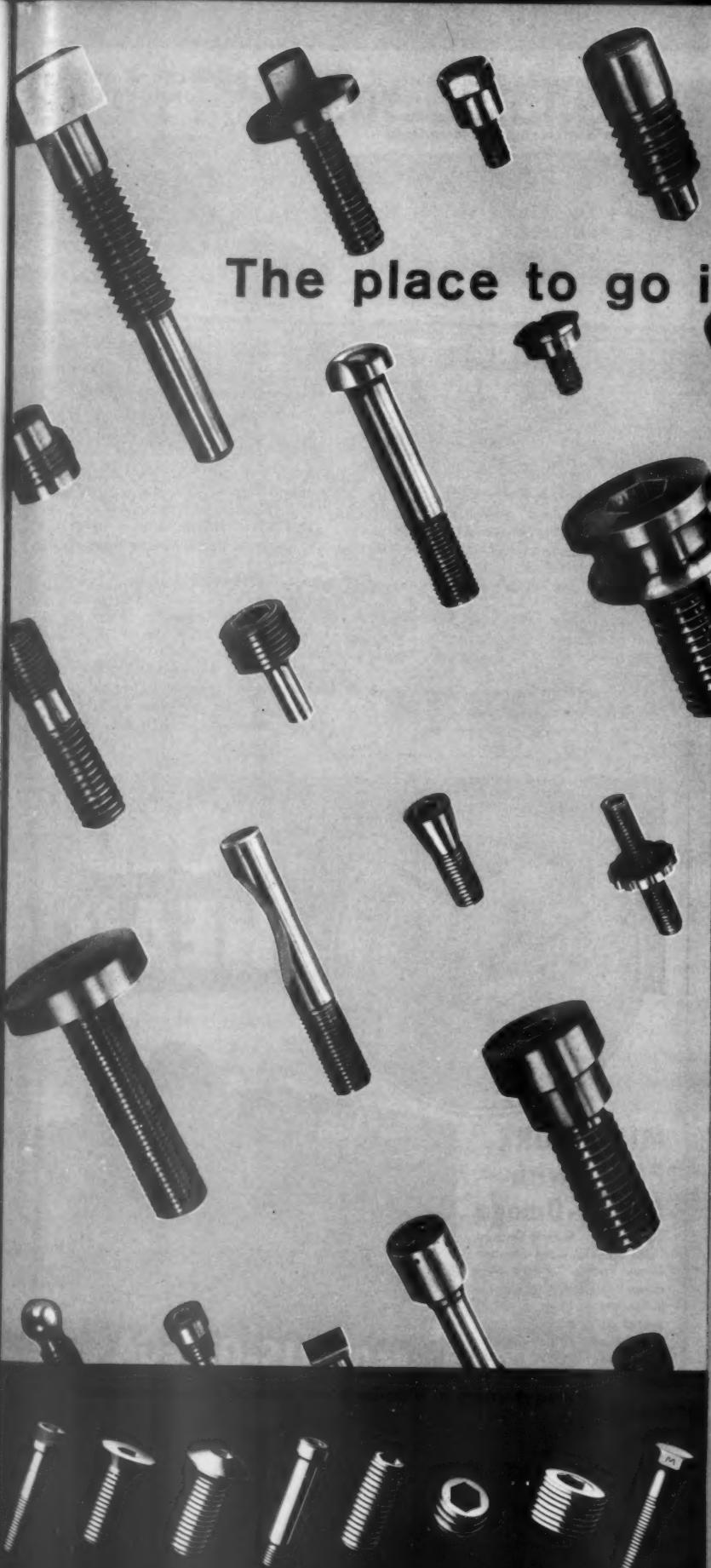
Use postpaid card. Circle No. 8

### AUTOMATIC ASSEMBLY UNIT FEATURES QUICK CHANGE-OVER



The Gilman "Transferline" standard automatic assembly machine features quick change-over from one assembly to another with minimum down time. Also featured in the machine are

individual shot pinning for accurate position of the fixture, automatic station lock-out which passes faulty or incorrectly assembled parts, 100% overtravel protection for fixtures, tool-



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**produced to  
exact designs**

**produced in  
large or small  
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**produced and  
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Mac-it Fastener Engineering Service will give you practical and professional assistance in developing any type of threaded fastener.

Unusual head or thread designs, unusual materials, unusual shapes —these are some of the unusual characteristics of Mac-it specials. But whatever you want, you'll find a personal, interested service group at Mac-it that is ready and able to match your requirements exactly.

And our service on standard alloy steel screws, like our service on specials, is geared to provide the same prompt action. Call Mac-it Engineering Service or contact your nearby Mac-it distributor for all your needs in alloy steel screws.

**MAC-IT PARTS COMPANY**  
LANCASTER • PENNSYLVANIA

# SPECIAL TOOLS FOR SPECIAL PROBLEMS

Odd as they look, these are actual production tools. They were manufactured by Xcelite to increase efficiency on special assembly work where conventional hand tools proved inadequate.

Chances are that "special function tools can speed your production. Supply prints (model if available) of part on which tool will be used. Prototype designed and toolled for your approval. Any quantity... to meet your production schedule. Contact factory direct. Complete information in new "Custom-made Tool" Brochure No. 660. Request on your letterhead.



**XCELITE**

**INDUSTRIAL  
HAND TOOLS**

XCELITE, INC. • ORCHARD PARK, N.Y.  
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52

ing and eliminating damage where it is physically impossible for station movements to carry out operations.

Gilman Engineering and Manufacturing Co., Janesville, Wis.

Use postpaid card. Circle No. 9

## NEW SIZE ADDED TO TOTE PAN LINE



A new Stack-n-Nest tote pan measures 22" x 14" x 5" and is designed to work in conjunction with the 22" x 14" x 8" Stack-n-Nest pan. The two sizes will interstack and internest. The same matching dolly and pan cover fits both sizes.

The tote pans are a one-piece fiberglass reinforced polyester molding, impervious to oil, water, and most chemicals.

G. B. Lewis Company, Department P45, Watertown, Wisconsin.

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## FEEDER HANDLES & ORIENTS PARTS 2½" LONG

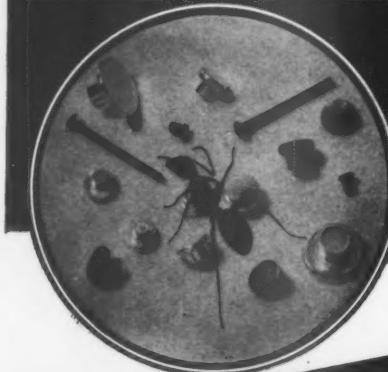


A new model vibratory parts feeder is manufactured to handle parts up to 2½" maximum length in an 18" bowl.

The Elk-O-Matic Model 201 vibratory parts feeder is electromagnetically powered and vibrates 3600 times a minute. These vibrations move the parts up and around the spiral track of the bowl, orienting them on the way, and discharging them in a single line feed. The rate of feed is easily controlled by the simple adjustment of a built-in or separate electric control, depending upon customer specifications.

Cast aluminum bowls for clockwise

# COLD HEAD



## MINIATURE PARTS with Morris-Omega

The new Morris-Omega "OO" SDDS Cold Header forms parts from wire down to .012" diameter in lengths as short as .016" — and at production rates as high as 150 per minute! The Model "OO" is only one of a series of precision heading machines, which includes a special open die type that will head parts up to 2¾" in length on wire sizes from .020" to .090".



For complete details and prices, write:

**REM SALES INCORPORATED**

SUBSIDIARY OF THE ROBERT E. MORRIS COMPANY  
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Assembly & Fastener Engineering

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# Gold Mine for Cutting Fastening Costs



## Size, Type, Metal, Finish . . . We Have Them All

PEM Self-clinching Fasteners are the captive threads for Production Fastening.

They are "installed by a squeeze, one or more at a time, with the greatest of ease" utilizing standard pneumatic or oil-hydraulic squeezers or mechanical presses.

The squeezing action embeds the head projections into the sheet—the displaced metal flowing smoothly and evenly around the back-tapered shank and annular groove to securely lock the fastener into the panel with

high torque and push-out resistance.

Used as standard equipment by the leading manufacturers of electronic, electrical and mechanical equipment, they are the solution of many particular engineering and production fastening problems.

Also, the diversification of products permits wide application of the same PEM self-clinching principle—providing one dependable source for all fastener needs.



### PENN ENGINEERING & MANUFACTURING CORP.

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TOLEDO—GREENWOOD 4-9563

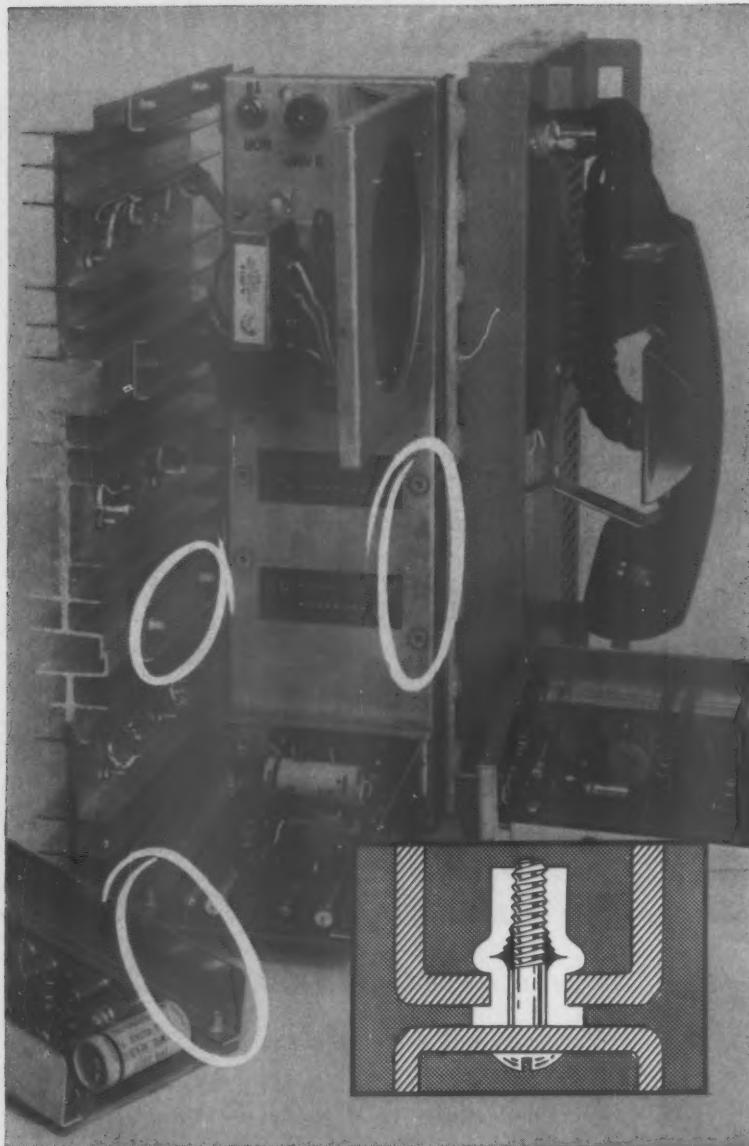
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**RIVNUT FASTENERS LICK VIBRATION PROBLEMS ON TRAIN TELEPHONES.** These portable carrier telephones, used on rapid transit cars, have to withstand frequent handling and train vibration and shock. The rugged construction includes use of RIVNUTS for vibration-resistant fastening. The manufacturer, Femco, Inc., of Irwin, Pennsylvania, also cut costs with RIVNUTS by speeding up assembly of components. RIVNUTS are the first blind fasteners with internal threads—provide strong nutplates in thin-gage metal. For data booklet showing applications, sizes, and tool data, write Dept. AE-6, B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Akron, Ohio.

**B.F.Goodrich RIVNUTS**

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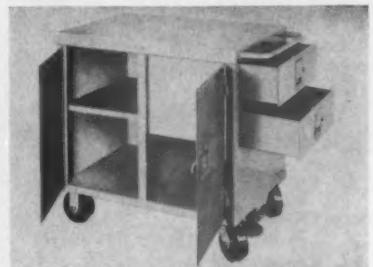
54

or counter-clockwise feed are made with single  $\frac{1}{8}$ " track width or double  $\frac{3}{4}$ " track width.

Elk Engineering Works, St. Marys, Pennsylvania.

Use postpaid card. Circle No. 11

**PORABLE WORK BENCH HAS LOCKED STORAGE SPACE**



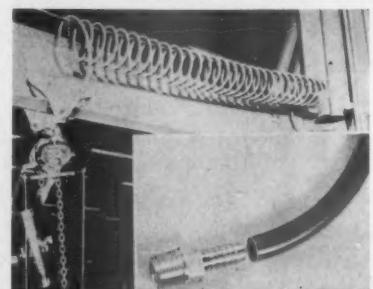
A mobile workbench incorporating two drawers with individual locks permits two men to keep valuable tools and crib-charged equipment separate and protected while working from the same mobile unit. Its compactness, mobility and rugged construction are said to make it ideal for production service.

The Roll-a-Bench top provides six sq. ft. work surface which will accommodate any vise. The unit also can be provided with convenience outlets and an extension cord for electrical equipment. The drawers, mounted in the end of the bench are 23" long, 14" wide and 6" high.

Overbeke-Kain Co., 20904 Aurora Rd., Bedford, Ohio.

Use postpaid card. Circle No. 12

**SELF-STORING AIR HOSE HAS 4 TO 1 SAFETY FACTOR**



Self-storing air hose is now available with extra wall thickness. It is designed for use where plant air pressure is greater than average or where mechanical stresses are extreme.

This heavy duty hose is helically coiled like a spring. It extends like a telephone cord to the needed working length. After use, it retracts into a small storage space—about 1/30th of its maximum working length.

Minimum working pressure with 4 to 1 safety factor is 250 psi at 75°F.

Synflex Products Div., Samuel Moore & Co., Mantua, Ohio.

Use postpaid card. Circle No. 13

Assembly & Fastener Engineering

**CENTRIFUGAL FEEDER  
COUNTS & ORIENTS PARTS**



The 30" Disc-O-Matic parts feeder can be used to orient, feed and count such items as washers, nuts and bushings at speeds up to 3000 parts per minute.

Where gentle batching or handling is required, the unit can be slowed down so as to give a comparatively high rate of feed, and at the same time provide gentle handling of delicate or fragile parts.

Count-O-Matic Inc., U. S. Engineering Co., 40-24 22nd St., Long Island City 1, N.Y.

Use postpaid card. Circle No. 14

**MAGNIFYING LAMP EASILY  
POSITIONED FOR ASSEMBLY**



A new gooseneck version of their Inspector magnifying lamp has an all-directional flexibility of the gooseneck stem. The lamp, Model M-4, is especially suited for precision work in places where space is limited. It has proved useful for benchwork in labs, shops and assembly lines.

The lamp combines a 22-watt, shadow-free Circline fluorescent lamp and a 5" diameter precision-polished magnifying glass with a 13" focus. The gooseneck stem is 15" in length and has a swivel-joint head for full mobility and easy placement in any position. Swing-O-Lite, Inc., 13 Moonachie Rd., Hackensack, N.J.

Use postpaid card. Circle No. 15

**HOLD-DOWN TOGGLE CLAMP  
HAS 800 LB HOLDING POWER**

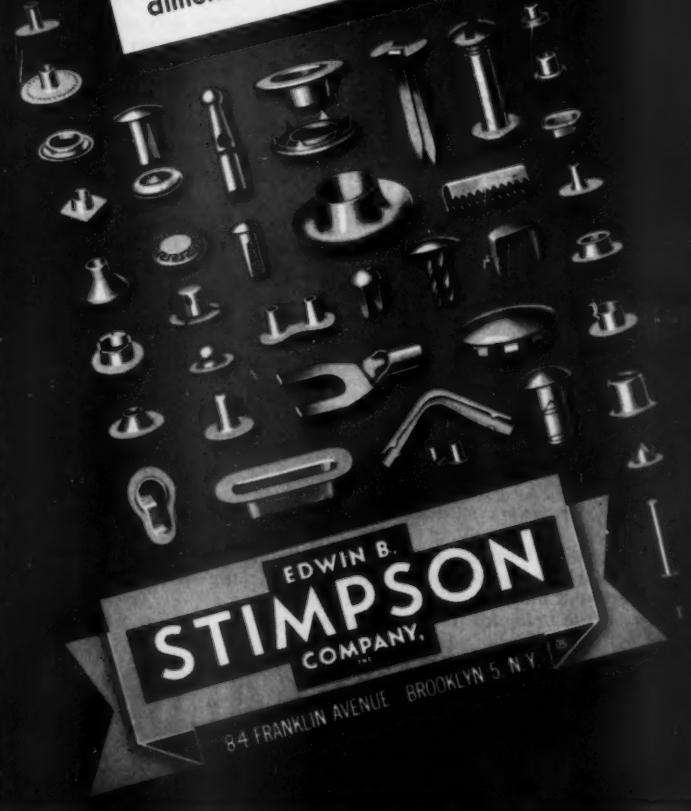
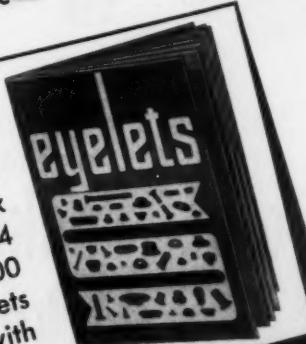
A medium duty toggle clamp is designed especially for attachment by welding the front or top of its base to the sides of conveyors or containers and the edges of lids or covers.

The new clamp, Model 325, weighs 15 oz. and has a holding pressure rated at 800 pounds. Its jaw, or hold-down bar is made of forged alloy steel and moves 90° to clear the working area.

# Are You Familiar With The Different Articles We Make?

You will find us prepared to supply a type of fastener that is exactly suited to your specific requirements. If you use split rivets, tubular rivets, side-prong rivets, eyelets, washers, grommets, snap fasteners, or any other similar metal article—write for samples and prices—today.

Send for your copy of this valuable free book. Actual size 8 1/2 x 11—contains 104 pages—over 2000 standard eyelets are shown with dimensions.



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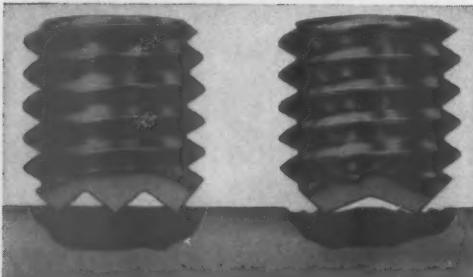
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Samples and complete technical data  
on the new

## W-Point<sup>TM</sup> Socket Set Screw by Parker-Kalon<sup>®</sup>

Job-test this revolutionary new socket set screw in your own applications . . . get the highest degree of holding power ever attained. See how this new cup edge and pivot point development gives cleaner, far more uniform circular tracking — eliminates wobble and tipping. Greater contact area provides:

30% MORE BACK-OUT TORQUE  
50% MORE RESISTANCE TO VIBRATION  
50% MORE RESISTANCE TO ROTARY SLIPPERY  
ALL THIS — AT NO INCREASE IN PRICE!



Cutaway of W-Point Socket Screw (left) shows more even tracking, better contact than conventional cup-point variety (right).

Look to P-K<sup>®</sup> for socket screws for every design requirement—including the vibration resistant LONG-LOK with nylon-type polymer insert—the most complete line in the industry.

Write today for free samples and Technical Bulletin #1106.

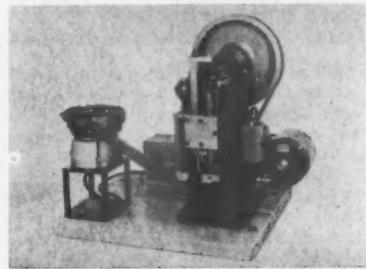
# PARKER-KALON

PARKER-KALON a division of General American Transportation Corporation  
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Available from Industrial Distributors coast-to-coast  
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Holes in the base which are 17/64" diameter allow for special mounting applications.

Detroit Stamping Co., 330 Midland Ave., Detroit 3, Mich.  
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### RIVETING UNIT SETS OVER 2000 TERMINALS PER HOUR



A turret terminal riveting machine costing less than competitive models of similar capacity, inserts and sets all makes of electronic terminals, and base pins at speeds in excess of 2,000 per hour. The Model 900 is ideally suited to the electrical and electronic industries for setting electronic terminals in printed circuit boards and other electronic components.

The machine is operated by an electric foot switch. A vibratory hopper is employed to insure continuous flow of the terminals to the riveting jaws. Electrically interlocked microswitches provide fail-safe operation. The hopper and track handle varying lengths of turret terminals with no change in tooling.

Eyelet Tool Co., 31 Carleton St., Cambridge 42, Mass.  
Use postpaid card. Circle No. 17

### WIRE RETAINER FOR HARNESS BOARD ASSEMBLY

Wiretainers are designed to provide a firm grip on individual wires while wiring any type of harness board. With a single motion each wire is secured until all wires are ready for lacing. The unit maintains an orderly harness board, eliminates the practice of using tape, tacks or other means which can harm wires during layout.

They are available in 2 categories; narrow gauge for wires from .010 to .040 and broad gauge to hold wires from .045 to .080. Either gauge is available to hold from 2 to 12 wires inclusively.

Holtronics, 7100 Avalon Blvd., Los Angeles 3, Calif.  
Use postpaid card. Circle No. 18

### HEATED TEFLON-LINED HOSE CARRIES POTTING COMPOUND

Electrically heated Teflon-lined hose is designed for conveying potting compounds without heat loss.

The hose is flexible and especially desirable for applications where melted compounds must be delivered to point of application at a usable consistency.

It may be used with either a gravity flow arrangement, or pressure tanks and pumps may be employed to aid the flow of material.

The Teflon lining is shielded by an outer stainless steel braid enclosed in an extruded Teflon protective sleeve. Power supply leads are attached to terminals at each end of the hose. The power source is a variable voltage step-down transformer having a primary of 115-230 V, single phase.

Sta-Warm Electric Co., 553 N. Chestnut St., Ravenna, Ohio.

Use postpaid card. Circle No. 19

#### RETAINING RING PLIERS HAVE HEAVY DUTY RATCHETS



Two new heavy duty retaining ring pliers have a double-ratchet construction which reduces the effort necessary to spread or compress the rings and locks the pliers at any given point of expansion or contraction.

The 5R pliers are designed to compress internal-type rings for assembly or disassembly in a bore or housing.

The 6R pliers expand external rings for installation or removal over a shaft.

Both pliers are equipped with replaceable tips bent to a 15° angle to facilitate ring assembly and disassembly.

Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N.Y.

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#### PNEUMATIC DRIVERS HAVE ADJUSTABLE TORQUE CLUTCH



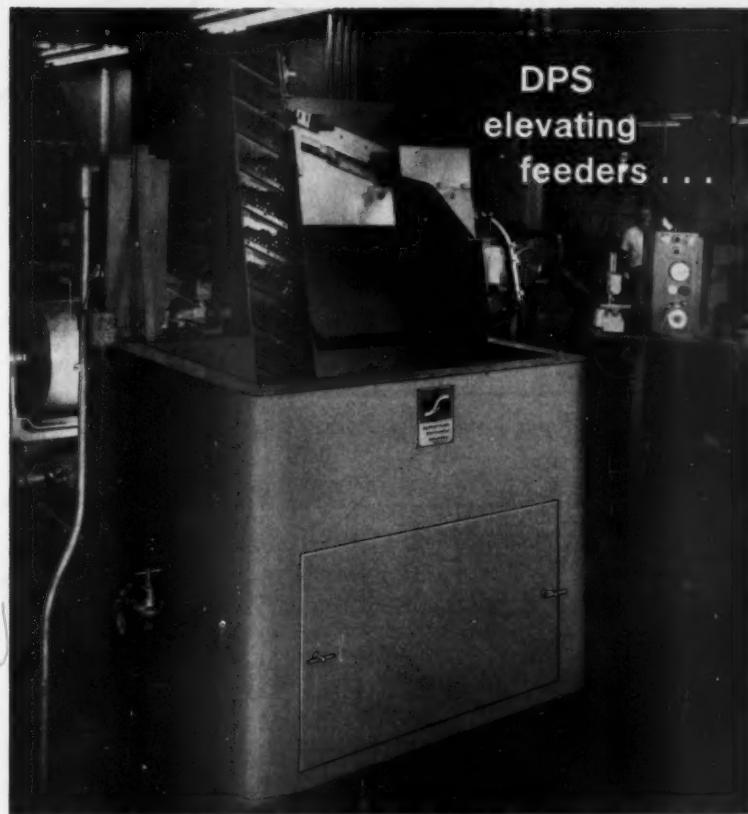
The 41F Series of air-powered, pistol grip screwdrivers and nutrunners has been enlarged by the addition of two models equipped with a torque control clutch.

The clutch is adjustable for any desired torque from 5 to 100 in. lbs. Clutch jaws automatically disengage when a pre-set torque is reached, and as soon as the tool is released from the work the clutch automatically sets itself for the next fastener.

The nutrunner Model 41F-174, has a  $\frac{3}{8}$ " square drive front end; as a screwdriver Model 41F-134, the tool has a  $\frac{1}{4}$ " female hex spindle.

Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio.

Use postpaid card. Circle No. 21



This 6-cu. ft. DPS elevating feeder handles 36 different sizes of rollers for spherical roller bearings. Rollers are elevated to feed track, where they are oriented, and sent along track to grinder in a continuous flow.

## store and orient parts . . . feed at high speed

Today, many processing and assembly machines are not producing at rated capacity because of inadequate feeding arrangements. Hand feeding methods are often unable to match rated capacity of modern equipment . . . production suffers.

DPS elevating feeders are helping industry meet their feeding requirements. They orient and feed parts gently, and in a continuous flow to match production rates . . . handle parts of almost any material (metal, plastic, felt, rubber, etc.) and of practically any shape. Versatile in design, the elevating mechanism can be engineered to discharge parts to either side of feeder and at desired height. Feeders with 3, 6, 12 or 20 cubic foot storage hoppers are available.

Your DPS engineer is in a unique position to recommend the one best feeder from its line of rotary, vibratory and elevating types . . . the most complete in industry. Write or call today. Ask for elevating feeder folder 2812.



#### DETROIT POWER SCREWDRIVER CO.

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Selective Parts Feeders; Screw, Nut and  
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## --every PALNUT® LOCK NUT is Dependably Uniform

- in dimensions -- in spring tension
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Users of PALNUT Lock Nuts value their uniform quality as highly as they do the low price, assembly savings and unfailing locking action.

PALNUT Lock Nuts are mass-produced in huge volume at low cost on the most modern equipment. Quality is rigidly controlled by inspections at every step of production. Result: Each PALNUT assures your assemblers of precision thread fit—uniform hex shape—easy wrenching—free turning—accurate torquing, to speed up assembly and reduce rejects.

Learn how PALNUT Lock Nuts can cut your assembly costs, reduce fastening parts and assure vibration-proof tightness. Send details of your application for free samples and latest catalog.

### THE PALNUT COMPANY

Division of UNITED-CARR Fastener Corp.

79 Glen Road, Mountainside, N.J.

Canada: P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

LOCK NUTS and FASTENERS



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### VIBRATOR MOVES HARD TO FLOW PARTS



Designed to move hard-to-flow materials, the Vibra-Pak keeps small parts, granular or bulk materials moving freely in hoppers, tracks, bins and chutes. Other applications include bulk feeding, parts jogging, screening and packing. Its use eliminates sticking, arching and bridging.

Entirely portable, the box-like housing is attached at the point where vibration is desired. Plugged into 110-volt, AC power, the unit initiates a gentle, pulsating motion at the rate of 3600 vibrations per minute.

Automatic Feeder Co., 4752 W. Washington Blvd., Chicago, Ill.

Use postpaid card. Circle No. 22

### ULTRASONIC WELDER HAS INCREASED THROAT DEPTH



A new ultrasonic spot welding machine fits easily into closely packed production areas where a minimum of space is available.

The Model W-4000-FSR offers an increased throat depth to 36", and incorporates many of the advances in the design and development of ultrasonic welding equipment, based on actual field experience with previous models.

The 4000 watt unit is effective for joining refractory metals, such as molybdenum, niobium, tantalum and tungsten.

Sonobond Corporation, 310 E. Rosedale Ave., West Chester, Pa.

Use postpaid card. Circle No. 23

### AIR-HYDRAULIC UNIT SETS RIVETS UP TO 5/16" DIA.

Operating on only 80 psi air pressure, and a hydraulic booster, the Model 211 riveter will automatically feed and set either of two lengths of rivets up to 5/16" diameter with a setting force of 10,000 lbs.

The unit is equipped with two sets of feeding parts, air and spring pin anvil and a work support bracket. The

selection of the rivet length required is accomplished automatically by a section of the workpiece contacting a micro switch mounted on the work support bracket.

Tubular Rivet & Stud Co., Quincy 70, Massachusetts.

Use postpaid card. Circle No. 24

#### BENCH MODEL POSITIONER HAS 100 LB CAPACITY



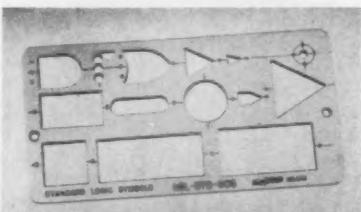
A compact 100-lb capacity bench model positioner is ideal for handling small work in assembly line operations, and educational and industrial laboratories. The Model B-1 tilts any load up to 100 pounds, at 1" center of gravity, through a full 135° range, and rotates the load at any speed up to 6 rpm. Weighing only 65 pounds, it can be mounted on bench or pedestal.

Power rotation has variable voltage for stepless variable drive and is controlled by a foot switch. Remote control of variable speeds by foot switch is an optional feature.

Ransome Company, Scotch Plains, New Jersey.

Use postpaid card. Circle No. 25

#### LOGIC SYMBOLS TEMPLATE MEETS MILITARY SPECS



Based on Mil-Std-806A, the No. 541 standard logic symbols template contains symbols designed for use on basic logic and engineering logic diagrams associated with digital processing systems.

The template is made of .060 tinted green plastic, and all cut-outs are beveled. The over-all size of the template is 7 1/2" x 4". The template is priced at \$3.00.

Rapidesign, Inc., P.O. Box 429, Burbank, Calif.

Use postpaid card. Circle No. 26

#### BELT CONVEYOR WITH TABLE FOR ASSEMBLY LAYOUT

A newly designed Beltable for the process industries consists of a flat belt conveyor with a table top on



Cut production costs by employing the features of dependable, air-operated Buckeye Automation Tools:

- Small offset, as close as 1 1/4" center distance
- Models from 650 to 22,000 RPM
- Adjustable stroke 0 to 2" with micrometer accuracy
- Adjustable feed rate
- One type of tool features total stroke of 2", of which 1" may be fully hydraulically controlled, preventing break-through damage to material and to sensitive cutting tools . . . also incorporates adjustable rapid approach for minimum cycling time.
- Tool accessories provide signals to control mechanisms which will automatically shut tool off . . . actuate other tools for subsequent operations . . . or automatically position the next part.
- Buckeye engineers will work with you in applying these tools to fit your requirements for drilling, tapping, fastening, grinding, reaming, counter-boring and wire brushing.

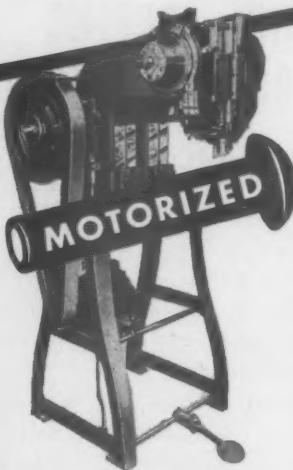
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**Buckeye Tools**  
CORPORATION  
P. O. BOX 966, DAYTON 1, OHIO  
Pioneering Power Tools for Industry Since 1920  
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# Why Chicago Rivet Offers TWO METHODS for Clinching Semi-Tubular Rivets

It is part of a widening service based upon industry's recognition that an assembly held together by semi-tubular rivets has great inherent strength and is usually lowest in production cost.



The Chicago Rivet MOTORIZED AUTOMATIC RIVET SETTER produces a sharp, solid blow that immediately upsets the tubular section. This method is used on 95% of all applications involving metals or non-fragile materials.



The Chicago Rivet AIRPOWERED RIVETER produces a cushioned, shock-free clinch on a tubular rivet, permitting riveting of fragile and uneven materials. This method has greatly widened the use of semi-tubular rivets.

## FOR YOUR FILES



RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.



AIR-POWERED RIVETING catalog contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automated operation.

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Why not let Chicago Rivet Fastening Engineers tell you which system is best for you. No obligation.

### MOTORIZED

Line includes automatic single, multiple and automated setters.

### AIR-POWERED

Line includes automatic single, multiple and automated setters.

**Chicago Rivet**  
& MACHINE CO.

946 So. 25th Ave., Bellwood, Ill.  
(Chicago Suburb) Branch Factory:  
Tyrone, Pa.

adjustable legs and can be adapted to practically any conveyor installation. The table top is adjustable transversely so that work can be performed on either or both sides.

Available in lengths up to 75', with variable speeds from 5' to 120' per minute in a ratio of 3 to 1, or in several ranges of constant speed, the table is ideally suited to processing, piece work, assembly, sorting, inspecting or similar work.

Standard Conveyor Co., North St. Paul 9, Minn.

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## AIR IMPACT WRENCH HAS CONTROLLABLE TORQUE

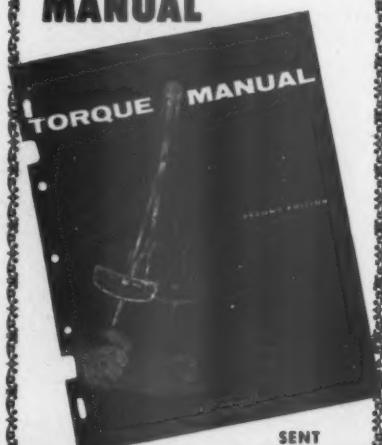
A  $\frac{1}{2}$ " square drive industrial air impact wrench, features controllable torque output to be controlled directly from trigger to mechanism, through an infinite range from a light rotary tap to a heavy impact blow.

The wrench is nominally rated at  $\frac{3}{8}$ " bolt size capacity, with  $\frac{1}{2}$ " square drive standard and  $7/16$ " hexagon ball lock spindle optional.

Thor Power Tool Co., Aurora, Ill.

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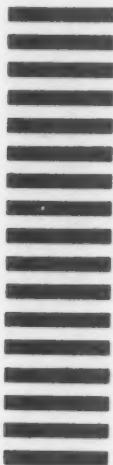
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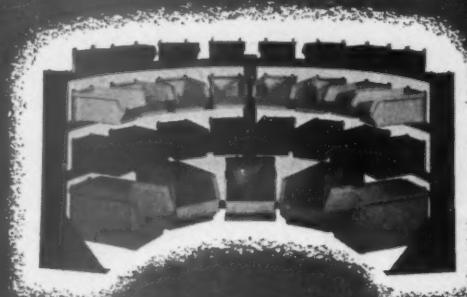
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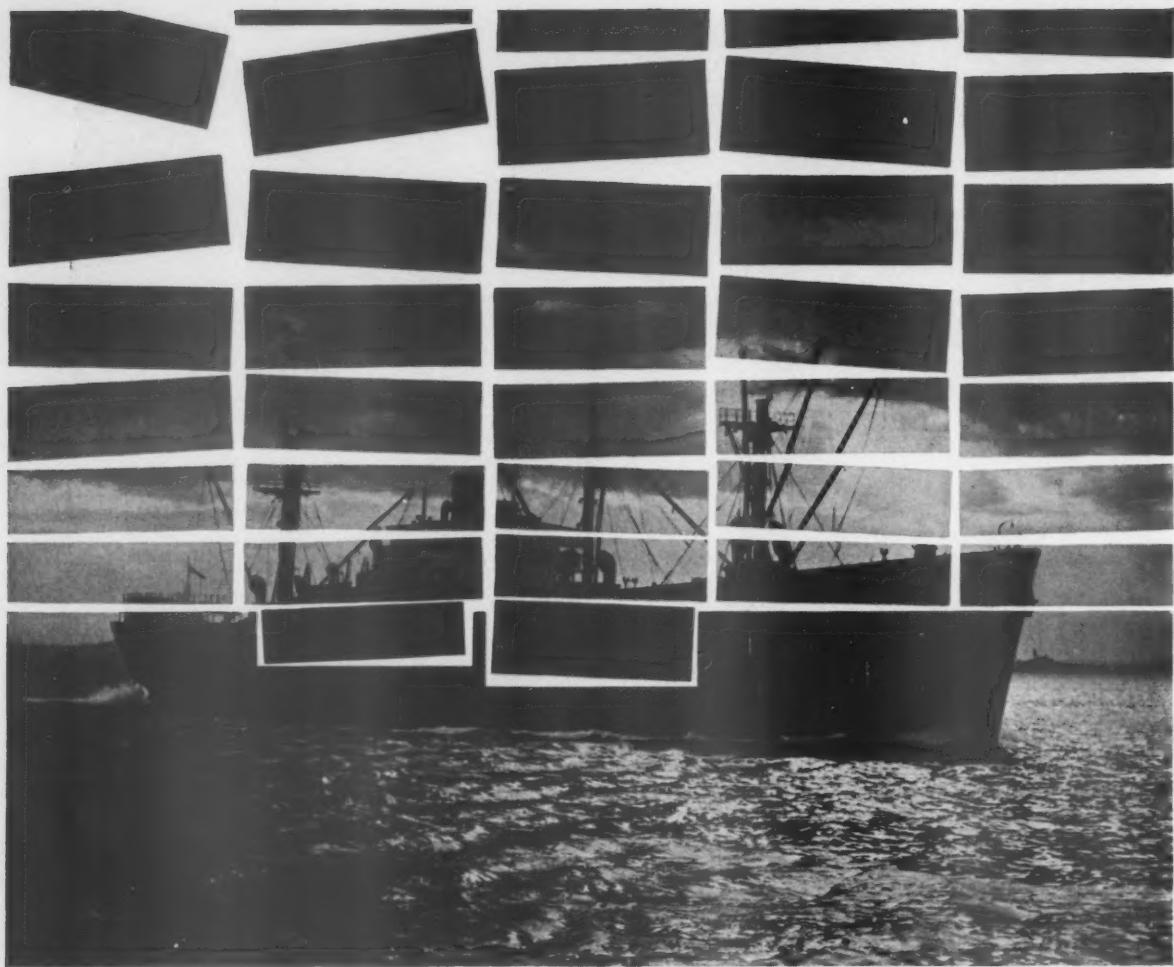
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New York Shipbuilding Corporation, Camden, N.J., formerly had to repair pickling tank leaks every 4 to 6 weeks. A 15% sulphuric acid solution penetrated the coating then used—caused tank corrosion and leaks. Now, all exposed tank surfaces are protected by CORO-GARD 1706 Brand Coating, and no leaks have occurred during more than a year's constant contact with the acid solution!

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What can CORO-GARD 1706 protect for you? Call the nearby 3M Field Engineer for technical assistance and information. He can also provide detailed data about hundreds of other 3M adhesive, coating and sealer formulations created to solve specialized problems in protection and fastening. Or write AC&S Division, 3M Co., Dept. SBZ-61, St. Paul 6, Minn.

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Pickling tank protected with CORO-GARD 1706 Coating experienced no corrosion, no leaks after more than a year's exposure to 15% solution of sulphuric acid.

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## WHAT'S NEW IN FASTENING AND JOINING



For further information on any of the fasteners or methods  
use the handy postpaid card opposite page 60.

### INSERT FORMS THREADS WITHOUT CHIPS

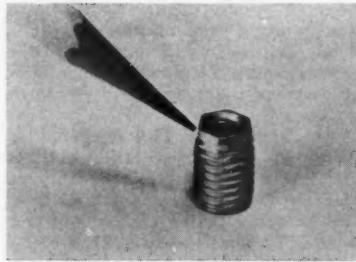
A new thread forming insert, which eliminates chips during the tapping operation, forms threads by means of narrow, threaded lands on the insert, with angles so designed that they cause metal to flow around the insert as it is driven in.

Ideal for use in such areas as aircraft and electronics, where chips must be avoided, the chipless Tap-Lok insert can open up new design possibilities in many areas where designers could not use self-tapping inserts because of the chip problem.

Manufactured of C1018 steel, case-hardened and cadmium plated, they will be available in sizes from No. 4 through 5/16" diameter.

Groov-Pin Corp., 1125 Hendricks Causeway, Ridgefield, N.J.

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See No. 30

mounting, eliminating rivet holes, riveting, and special tooling for production line installation. The fastener is reported to incorporate a unique locking action for positive locking and release with minimum finger pressure. One push locks the fastener, and a second push releases it.

Camloc Fastener Corp., Dept. 2-A, 14 Spring Valley Rd., Paramus, N.J.

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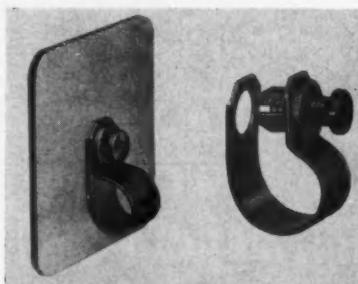
### PRESTACKED RINGS AID AUTOMATIC ASSEMBLY

Series 3100 external retaining rings are prestacked with lugs aligned. They can be used readily in automatic or semi-automatic assembly systems.

Other advantages of the prestacked rings are the elimination of time spent sorting and untangling the rings, and inventory controls are simplified, since each prestacked unit contains 250 rings.

Industrial Retaining Ring Co., 57 Cordier St., Irvington 11, N.J.

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### CABLE CLAMP HAS RE-USABLE BLIND FASTENER

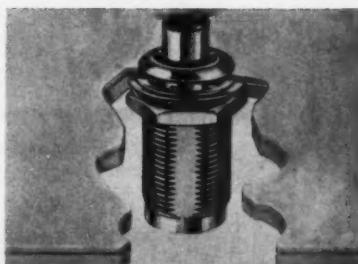
A nylon clamp utilizing the Nylatch fastener for support and clamping of wires, conduit, cable or other lines can be fastened and unfastened indefinitely. It is a blind attachment. Installation is made from one side of the supporting structure.

The assembly consists of the clamp in which the fastener is held captive in one arm of the clamp. The clamp is secured by pressing the plunger in. Unfastening is accomplished by merely lifting the plunger.

The clamps will support loads up to 75 pounds and can be used in temperatures from -20° to +150°F.

Hartwell Corporation, 9035 Venice Blvd., Los Angeles 34, Calif.

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See No. 32

### PUSH-BUTTON FASTENER FOR PANEL ASSEMBLIES

A quick-mounting, compact, push-button fastener for rapid access to panel assemblies, cabinets, and components requires only single-hole

### CABLE CONNECTORS FIT ALL SIZES UP TO 750 MCM

A complete line of cable connectors, panel and machine receptacles and cable lugs to fit flexible power cables ranging in all sizes up to 750 MCM is available in several materials. For waterproof connections, a neoprene insulated style is available.

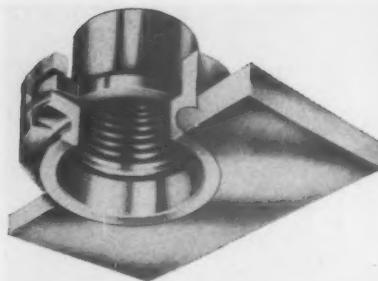
Cam-Lok Division, Empire Products Inc., 9213 Blue Ash Rd., Cincinnati 42, Ohio.

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### CONTROL KNOB FEATURES 36 to 1 TURNING RATIO

Featuring a 36:1 ratio between setting knob and output shaft, the Mini-Dial is useful as a setting control for potentiometers, condensers, coils and synchros.

It may be inserted upon any shaft which projects from a panel. A coarse



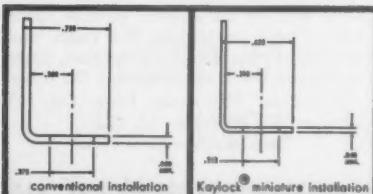
## Reduce weight Reduce space add Reliability!

Kaylock® Miniature Stake Nuts answer the critical need for installed reliability of threaded elements in minimum thickness materials.

### GREAT FOR ITS SIZE

these Kaylock Miniature Stake Nuts are available in floating and non-floating configurations. They are EASIER and QUICKER to install than most conventional types of fasteners for thin material application.

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first in lightweight locknuts

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Renton, Wash.; Montreal; Paris; London; The Hague



**MK 7200**  
Miniature Stake Nut



**MF 7200**  
Miniature Floating  
Stake Nut

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knob is connected 1:1 to the output shaft for rapid turning.

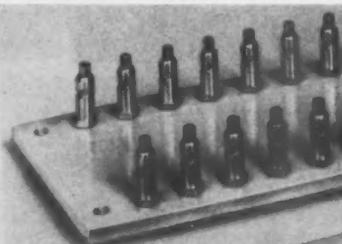
A built-in slip clutch prevents damage to devices of limited-motion.

Having a face size of 3-1/16" square, and an accuracy of 0.2°, scales are available in 0° to 360° or 0 to 100 divisions.

Theta Instrument Corp., 520 Victor St., Saddle Brook, N.J.

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### TERMINAL BOARD ASSEMBLY HAS SPRING LOADED CLIPS



A component clip terminal board assembly suitable for quick disconnect of all types of components comes completely supplied and completely assembled with spring loaded diode clips for easy and positive use by the design engineer.

The Cambion No. 1422 is useful for semi-conductor aging racks and in making prototypes, testing and in test labs. The board is manufactured from GSG laminated silicone glass cloth per Mil-P-997B and measures 2" x 13 1/8".

Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.

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### ADHESIVE HAS HIGH PEEL STRENGTH

A general purpose neoprene contact adhesive for bonding a wide variety of materials, giving bonds that have high peel strength, remains permanently strong and resilient, and has good water resistance.

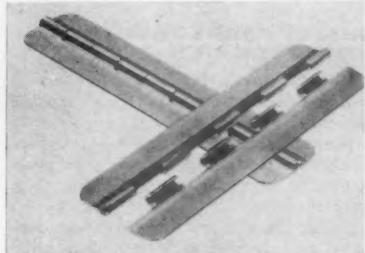
The adhesive, D-239, was designed for bonding supported vinyl fabrics to metal, wood and composition bases; thin gage metals or foils to wood, and composition bases; and also for bonding the new fabric backed urethane sheets, to metal, wood and composition bases.

The adhesive is available in one-half pint cans, 48 to the carton; one pint cans, one quart cans, one gallon cans, five gallon pails and 55 gallon drums.

Armstrong Cork Co., Lancaster, Pa.

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### EXTRUDED ALUMINUM HINGES FOR HEAVY DUTY USE



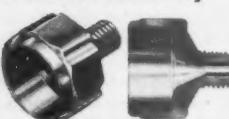
A new extruded aluminum hinge, for heavy or light duty use is available in lengths up to 12 feet long.

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Assembly & Fastener Engineering

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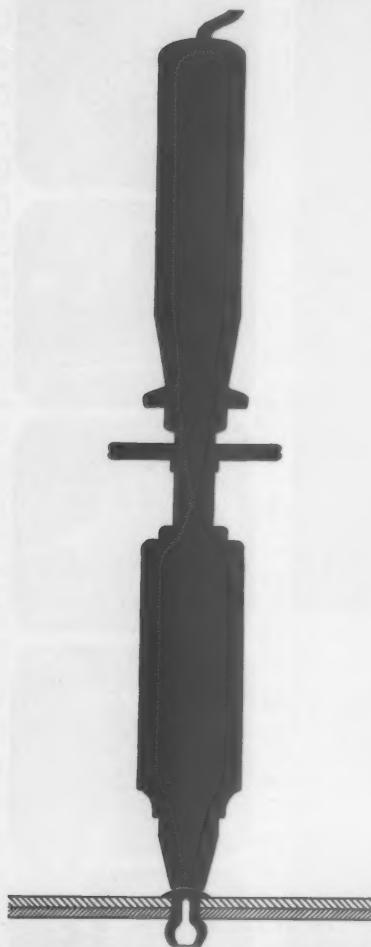
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Developed by DuPont, this new idea in fasteners is safe, simple and economical. All you need is a soldering iron.

- One unskilled operator can set up to 25 per minute.
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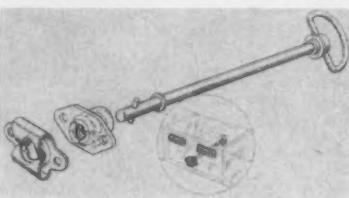
The hinge is available in the standard continuous design or may be ordered with the nodes of one hinge half slotted to permit the assembly to swing open and detach. This separable feature eliminates the necessity of spring loaded hinge pins and permits precision closures to be maintained under heavy duty use.

The extruded hinge line is suitable for spotwelding or riveting, and is furnished with a ball burnished stainless steel hinge pin that can be installed after the hinge halves are painted. All hinges have one inch nodes and open to an over-all two inch width.

TA Manufacturing Corp., 4607 Alger St., Los Angeles 39, Calif.

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### MODULE FASTENER FOR MULTIPLE PIN CONNECTORS



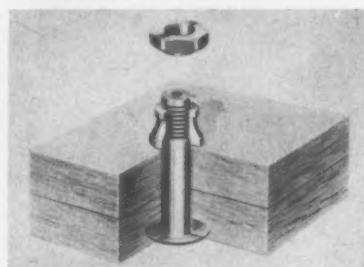
Easy engagement and disengagement of module to rack and positive lock of multiple pin connectors is provided by a rapid traverse fastener. Assembly is composed of a variable length stud shank, a nylon guide bushing and a

standard, military approved,  $\frac{1}{4}$  turn Airloc receptacle. When cross-pin on stud shank travels  $1\frac{1}{4}$  turns through glide bushing, steady, even pressure is exerted laterally across the connector. An extra  $\frac{1}{4}$  turn locks the cross-pin in the receptacle, securing module in the rack and firmly engaging connector. The module slides out smoothly by  $1\frac{1}{2}$  turns of stud.

Monadnock Mills, Subsidiary of United-Carr Fastener Corp., San Leandro, Calif.

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### FASTENER DESIGNED FOR SOFT MATERIALS



The Buship version of the Hi-Lok fastener is designed specifically to give a pre-established torque level safely below the critical bearing value of the plastic materials encountered, eliminating the problems of crazing or cracking.

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Simply place plug in reamed hole. Drive in tapered pin until ends are flush. Controlled expansion causes grooves to "bite" into casting, assures a bone dry seal that withstands pressures up to 40,000 psi. Now widely used on aircraft and missiles, and for pumps, servo valves, regulators, etc.

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67

fastener suitable for cold riveting of reinforced plastic to plastic, plastic to metal, and wood to metal.

Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 40

#### SILICONE-EPOXY COMPOUNDS FOR ENCAPSULATION

An epoxy-silicone rubber combination material has a variety of applications for potting, impregnating, caulking and molding. The new series of compounds are made with basic silicone rubber materials manufactured by the Silicone Products Dept. of General Electric.

The combination materials possess excellent adhesion, handling ease and rugged physical properties. The epoxy materials are flexible and retain flexibility after heat aging for prolonged periods at 450° F.

Emerson & Cuming, Inc., Canton, Massachusetts.

Use postpaid card. Circle No. 41

#### PLASTIC MAGNETIC STRIP AVAILABLE IN COLORS

Koroseal vinyl magnetic strip, previously available only in one basic color, is now available in nine standard colors, and can be manufactured to meet any color specification.

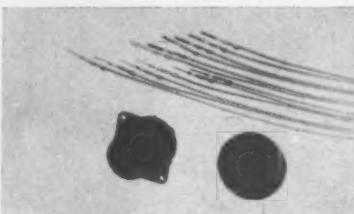
The colored surfaces are non-staining, can be wiped clean with a damp

cloth, are non-toxic and color-constant.

B. F. Goodrich Co., 500 S. Main St., Akron 18, Ohio.

Use postpaid card. Circle No. 42

#### BAYONET-LOCK CONNECTOR WITH MIL-C-26636 CONTACTS



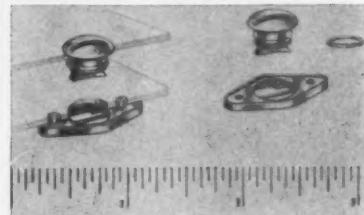
A series of miniature-environmental connector featuring contacts to MIL-C-26636 geometry and a bayonet-lock coupling mechanism will also mate with existing MS 3110 and 3116 connectors.

Additional advanced design features of the DTK series include: color keyed index grooves for groove-free engagement and alignment; seven point lock indication for both visual and blind mating inspection; silicone inserts for higher operating temperatures and a complete inter-facial seal.

The Deutsch Co., Electronic Component Div., Municipal Airport, Banning, California.

Use postpaid card. Circle No. 43

#### QUICK OPENING FASTENER FOR ELECTRONIC USES



The Simmons Mini-Q-Lock, a quick-operating fastener, is a miniature version of the Quick-Lock. It has been developed especially for miniaturized electronics applications, where space and weight limitations are important considerations.

Simmons Fastener Corp., N. Broadway, Albany 1, N.Y.

Use postpaid card. Circle No. 44

#### TUBE-TO-HOSE FITTING REQUIRES NO ADAPTER

A new fitting in the Lenz full line of medium and high pressure industrial hose fittings, eliminates the need for a female swivel or any threading, flaring or soldering of tubes or pipes. The tube need not be cut straight or to exact length. The fitting gives the tube added support and is not affected by vibration. Since there is no damage

#### APCO TORQUE TOOLS TO MEET EVERY REQUIREMENT



Apco Mossberg manufactures over 75 standard styles of torque tools ranging from an inch gram to 2000 foot pounds. In addition, they build many special tools for specific applications.

Every Apco torque tool is manufactured to rigid specifications to assure you the best available. They meet government standards, and are built to withstand 50,000 flexes without adjustment.

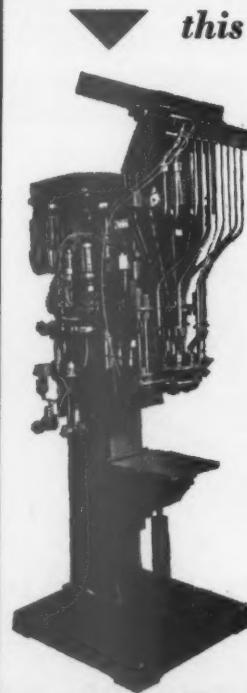
The Apco Mossberg Catalog of Torque Tools describes all styles, giving full information as to capacity, sizes and price. Write for your copy now.

- Special Purpose Wrenches
- Original Equipment Wrenches
- Torque Tools

**APCO MOSSBERG**  
COMPANY  
215 Lamb Street, Attleboro, Mass.

Use postpaid card. Circle No. 235

*this machine will  
drive up to  
10 screws at  
one time . . .*



... reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screwdriving to assembly of electric power drills.

Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

**COOK & CHICK COMPANY**  
2415 West 24th Street Chicago 8, Illinois

Use postpaid card. Circle No. 256

Assembly & Fastener Engineering

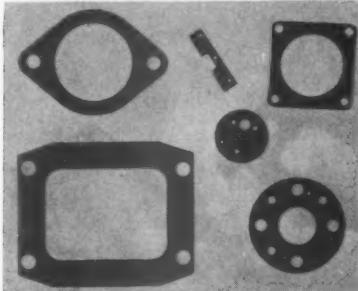
to the tube or fitting in installation, they can be reused or reassembled as often as desired.

These fittings are available for either double wire braid hose Series 216, or single wire braid hose Series 116, and the full line ranges in hose size from 3/16" to 1 1/2" I.D. with tube O.D. from 1/4" to 1 1/2".

The Lenz Co., 3301 Klepinger Rd., Dayton 1, Ohio.

Use postpaid card. Circle No. 45

#### DRY ADHESIVE FILM PERMITS PREFORMING TO EXACT SIZE



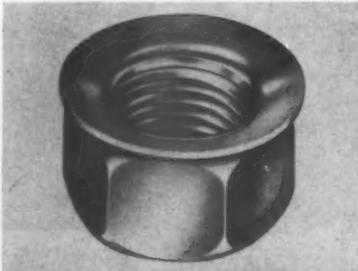
A two-mil industrial thermosetting dry adhesive film on a paper interliner permits cutting or preforming to exact size and shape required for optimum mating of the pieces.

The Auburn 18 film provides controlled thickness for a uniform adhesive layer at the glue line, and the bond, after cure, is heat resistant. It withstands exposure to water solvents and hydrocarbons.

Auburn Manufacturing Co., Middletown, Conn.

Use postpaid card. Circle No. 46

#### WASHER-NUT ASSEMBLY FOR STUD MOUNTED DEVICES



A line of conical washers for mounting silicon rectifiers and other stud mounting devices combines both washer and nut to simplify handling and mounting. It has been designed to provide take-up spring pressure by utilizing a specially proportioned coned washer. This assures permanent contact between the rectifier and heat sink.

Silicon rectifier mounting Keps are available in sizes from 8-32 through 1/2-20 in carbon steel, corrosion resistant steel, aluminum, brass, and other suitable materials.

Shakeproof, Division of Illinois Tool Works, St. Charles Rd., Elgin, Ill.

Use postpaid card. Circle No. 47

# ALL Bristol socket screws are available with NYLOK\*

provides a self-locking grip against loosening due to vibration

For maximum reliability under severest conditions, Bristol offers its complete line of socket screws with the famous NYLOK self-locking inserts, including Bristol Multiple-Spline and hex socket set screws, socket-head cap screws, flat-head socket cap screws, button-head socket screws, socket shoulder screws, and socket pipe plugs. Here are their big features:

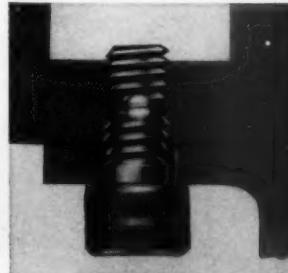
### They LOCK

... Bristol socket screws with patented NYLOK principle lock by means of a tough nylon pellet, permanently imbedded in the screw body. The pellet projects slightly beyond the crest of the threads and is compressed when the screw is inserted, setting up a counter-force that creates a strong engagement of the threads opposite the pellet. All necessity for lock washers, or other auxiliary holding devices, is eliminated.



### They SEAL

The NYLOK nylon pellet acts as a dam along the threads of the Bristol socket screw and positively stops all fluid leakage... far superior in this respect to ordinary screws which permit fluid leakage along a spiral path between the non-load-bearing thread flanks of screw and threaded hole.



### They ADJUST

... and stay adjusted, time after time. Bristol-NYLOK socket screws make ideal adjusting screws because they provide the same effective locking action regardless of whether they are fully seated. And, the pellet's resilience makes it possible to change adjustments with ease and accuracy.



Get full data on Bristol socket screws with NYLOK today... and remember, Bristol still offers the most complete socket screw line on the market, both plain and with NYLOK. See your authorized Bristol distributor or write the address below.

A.O.11

\*T.M. Reg. U.S. Pat. Off. The Nylok Corporation.

Precision socket screws since 1813... by the makers of famous Bristol Precision Instruments



\*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1 1/2" diameter.

**THE BRISTOL COMPANY** Socket Screw Division  
Waterbury 20, Conn.  
A SUBSIDIARY OF AMERICAN CHAIN & CABLE COMPANY, INC.

Use postpaid card. Circle No. 257

# "RIGHT SOUTHERN SCREW'S GOT 'EM IN STOCK!"



What Ft. Knox is to gold, Southern Screw is to fasteners. Southern's Statesville stock carries over 1,500,000,000 pieces of 100% USA-made quality fasteners. Warehouses in New York, Chicago, Dallas and Los Angeles, plus a nation-wide network of wide-awake Southern distributors, means that you can use the local source for Southern fasteners as your stockroom.

Now's the time to make Southern fasteners an economy factor in faster assembly and a quality factor in your products. Contact your Southern supplier, or write or wire now for current Stock List. Address: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.



MACHINE SCREWS & NUTS • TAPPING SCREWS • STOVE BOLTS • DRIVE SCREWS • HANGER BOLTS  
WOOD SCREWS • CARRIAGE BOLTS • CONTINUOUS THREADED STUDS • SPEAKER SCREWS

Use postpaid card. Circle No. 258

## USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 60.

### VINYL GRIP HANDLES

Brochure No. 204G describes complete engineering data and price information on a new line of aluminum, vinyl grip handles. It explains ordering details for procuring the handle in grey, black or strata blue, plus information on special types of mounting methods to cut cost in installation. TA Manufacturing Corp., 4607 Alger St., Los Angeles 39, Calif.

Use postpaid card. Circle No. 60

### PRE-CUT WIRE DISPENSERS

Faster wiring of harnesses, control panels, and electronic assemblies is possible with the wire dispenser described in bulletin 360. These plastic containers take bulk loaded wire lengths which are withdrawn one at a time. Containers can be used on any style or type of bench. Wires go from cutter to storeroom, to bench in one container. Products for Industry, Inc., 1704 Summer Street, Stamford, Conn.

Use postpaid card. Circle No. 61

### BALANCE & TORQUE REELS

The "reel" story, a four page brochure, illustrates and describes varied and wide line of industrial reels ranging in size from 1½ lbs to others weighing several hundred pounds capable of retracting up to one mile of cable. Aero-Motive Mfg. Co., 1803 Alcott St., Kalamazoo, Mich.

Use postpaid card. Circle No. 62

### AUTOMATIC RIVET MACHINES

Four-page brochure describes automatic rivet setting machines. It also illustrates uses for several styles of rivets, in present assemblies. Typical rivet proportions, along with tables and drawings of rivet configurations are included. Judson L. Thomson Mfg. Co., Sawyer Rd., Waltham 54, Mass.

Use postpaid card. Circle No. 63

### STRUCTURAL BOLT MANUAL

Specification and use of high strength bolts for shop fabrication of all types of structural steel assemblies are described in a new eight-page reference bulletin HHS-1. Covering every facet of the most recent development for fabricated structural joints, the illustrated manual contains design theory, specifications, documented cost and production studies and complete dimensional and physical data on high strength bolts, nuts and washers. Russell, Burdsall & Ward Bolt and Nut Co., 110 Midland Ave., Port Chester, New York.

Use postpaid card. Circle No. 64

### ADJUSTABLE BUSHINGS USE

A 32-page pamphlet, 60A, designed to describe quickly the product and typical usage of adjustable wall-thickness bushings and associated products. The pamphlet is illustrated with line drawings showing cylindrical fits in bolting structural joints, clevis and hinge pins, rod end bearing pins, bearing and seal applications. Adjustable Bushing Co., 12035 Vose St., North Hollywood, Calif.

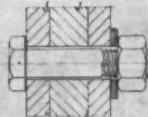
Use postpaid card. Circle No. 65

### DRILLING & TAPPING INSERT

Proper procedures for drilling and tapping aluminum, magnesium, steel and thermoplastics and other plastics to receive inserts are described in a new bulletin No. 765. In addition to basic drilling and tapping procedures, the bulletin treats such specific information as proper selection of tap for boss material, tapping lubricants, close-in characteristics of magnesium, and class of fit. A complete "H" Limits chart for both aluminum and steel cutting taps is included. Heli-Coil Corporation, 3102 Shelter Rock Lane, Danbury, Conn.

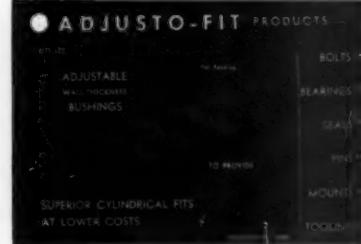
Use postpaid card. Circle No. 66

How to use  
and specify  
the new  
high strength bolts



R.B.W. RUSSELL, BURDSALL & WARD  
BOLT AND NUT COMPANY

See No. 64



See No. 65

For Methods, Tooling and Production Personnel  
**DRILLING and TAPPING**  
of Aluminum, Magnesium, Steel, Thermoplastics  
and Plastics on an Abrasive Surface To Receive  
HELI-COIL® Wire Thread Inserts  
(Supplement to 10-30, 10-31, and 14-16, Item 1010—12-85)

**HELI-COIL CORPORATION**  
Danbury, Connecticut  
Manufacturers of  
Heli-Coil® Stainless Steel Screw Thread Inserts,  
Screw-Lock Inserts and Tops; Tools and Gauges  
for their correct installation.

See No. 66

*On this Simple  
Slotted Head Screw  
OUR CUSTOMER*

*SAVED*

**OVER \$20.00**

*per thousand pieces.*



*with Redesign  
for*

**COLD HEADING**

by

**CLARK**

**THE PROBLEM:**

Cost of this special slotted head screw, when machined from bar stock by our customer, was considered too high.

**SPECIAL REQUIREMENTS:**

Head must be tapered and slotted. Thread gage must go to within  $1\frac{1}{2}$  threads of shoulder.

**SOLUTION:**

Production by Clark utilizing *cold heading* process.

**SAVINGS TO CUSTOMER:**

Over \$20.00 per 1,000 pieces.

Send sample or blueprint for prompt analysis and quotation . . . at no obligation.

**CLARK**  
**BROS. BOLT CO.**  
**MILDALE, CONN.**

Use postpaid card. Circle No. 259

**AUDIO-VISUAL ASSEMBLY**

Basic specifications of audio-visual assembly unit are given in four-page brochure. Illustrated and briefly described is typical audio-visual assembly unit set up. La Belle Industries Inc., 510 S. Worthington St., Oconomowoc, Wis.

Use postpaid card. Circle No. 67

**ADAPTER FITTINGS**

Catalog 4360 on pipe thread and straight thread adapters for tubing system connections has been revised and expanded to include straight thread adapters with new metal sealing rings. A. N. Aiman, Parker Fittings & Hose Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Use postpaid card. Circle No. 68



**TROLLEY CONVEYORS**

What a trolley conveyor can do to reduce manufacturing and handling costs, and how to select the right trolley conveyor for any requirement, are the

two main topics of a 58-page book, 2730. Examples of many installations, from small, relatively simple jobs up to the most complex systems are shown, with combinations of photographs and layout drawings. The book also shows how trolley conveyors aid in many tasks required in modern industry. Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Ill.

Use postpaid card. Circle No. 69

**DRILLS AND TAPPERS**

Two bulletins describe engineering data on automatic drilling and tapping tools for portable or stationary installation. Bulletin 93 describes and illustrates with full engineering information the Tru-Thread tapper. Bulletin 96 gives similar information for the Tru-Feed drill. Gardner-Denver Co., Quincy, Ill.

Use postpaid card. Circle No. 70

**ELECTROPLATING PROCESSES**

The 24-page, two color edition, EP-103, is an expansion of EP-102 Electroplating Processes Bulletin issued last year. Nineteen plating and other metal-finishing processes and procedures are described. Solution preparation, type of deposits, operating conditions, equipment required, and applications are listed for each of the processes. Hanson-Van Winkle-Munning Co., Church St., Matawan, N.J.

Use postpaid card. Circle No. 71

# brazing

preforms for the

## Electronics INDUSTRY

Meeting the demand for precise tolerances and the finest of alloys!

Precision dies and the most improved ring making facilities together with stocks in a wide variety of sizes of the silver-copper eutectic, silver-copper-indium alloys, silver-copper-tin alloys, fine silver and certified OFHC copper, enable us to better serve the electronics industry.

Stocks of common low temperature brazing alloys and the soft solders are always on hand, too.



FREE  
20 page booklet  
gives you all the  
facts on better  
brazing  
with pre-  
forms.



**LUCAS-MILHAUPT Engineering Co.**

5060 South Lake Drive, Cudahy, Wisconsin

Use postpaid card. Circle No. 260

## PLASTIC BOXES FOR ASSY.

New catalog fully describes and illustrates full line of Plastibox assembly containers and mounting accessories. G. B. Lewis Co., Dept. PX4, Watertown, Wis.

Use postpaid card. Circle No. 72



## PREHEATING BOOKLET

Many preheating and stress-relieving problems can be solved with the aid of 400-cycle induction heating booklet, EW-249, published by Hobart Brothers Company, Troy, Ohio.

Use postpaid card. Circle No. 73

## CLAMP ASSEMBLIES CATALOG

A 12 page catalog, No. JF-61 contains complete information and drawings of the more than 1000 clamp assembly and fixture component items that are available. Accurate Bushing Co., 440 North Ave., Garwood, N.J.

Use postpaid card. Circle No. 74



## STORAGE SYSTEM PLANNING

A new 16-page booklet on steel storage equipment is intended for use as a time-saving reference tool to help storage system planners quickly pinpoint their main storage objectives and the best ways to achieve them. The booklet contains 63 illustrations which show the many kinds of steel storage equipment at the disposal of storage system planners. Penco Division, Alan Wood Steel Co., 200 Brower Ave., Oaks, Pa.

Use postpaid card. Circle No. 75

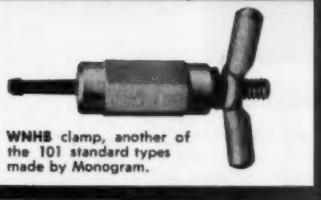
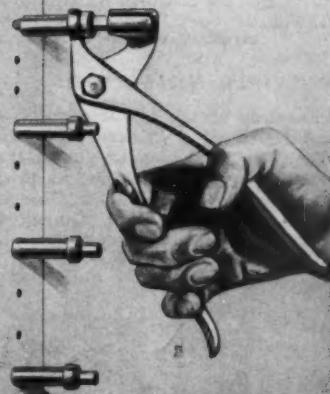
## TORQUE/TENSION TESTERS

A four-page folder showing production specialists how to take the guesswork out of bolted assemblies, outlines the importance of accurate torque/tension relationships to fastener efficiency. A series of photographs illustrates four simple steps to accurate power tool control in bolted applications. The folder also describes the company's line of torque/tension

# HOLD IT!

*...better, faster, at lowest cost with Monogram Kleko Clamps*

Stop wasting time and money with less efficient temporary fasteners and start solving all your sheet metal holding problems using MONOGRAM Kleko clamps and affixing tools. Write, wire, phone now for information on our 101 precision-engineered standard clamps for practically every temporary holding need during fabrication. And, if we don't carry the clamp you call for, we can make it faster, better to highest specifications.

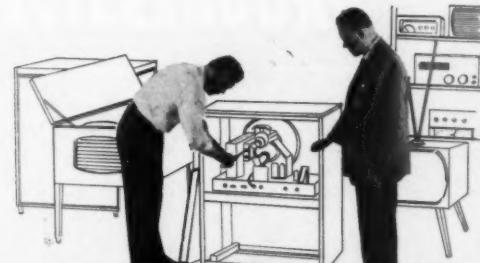


WNHS clamp, another of the 101 standard types made by Monogram.

**MONOGRAM Precision Industries, Inc.**  
8557 Higuera Street, Culver City, Calif., UP 0-6531

Use postpaid card. Circle No. 261

**Good...but how  
do you keep these  
two elements apart?**



**with a WIRE FORM especially  
designed by STANLEY SPRING!**

"Yes, there is more to the manufacturing of a spring than merely the coiling of wire.

"A trip through the Stanley Spring plant will quickly show you the many elements that Stanley has added to the manufacture of springs, wire forms and metal stampings...elements that make possible faster assembly...trouble-free units...satisfying service."

"Engineering skills...a complete and 'self-contained' die and tool producing department...manpower, with years of experience...managing the latest in the equipment...necessary to produce your every need in metal stampings...springs...and wire forms."

"Each plays a significant part in the development, in the creation, in the production of the particular spring, wire form or metal stamping needed to solve your particular problem...to do the job that you want done."

"Service...fast as flying...is the factor added to your request immediately. Getting the information or the samples to you almost as...fast as flying."

**STANLEY SPRING MFG. CO.**  
5050 W. FOSTER AVE. • CHICAGO 39, ILL. • SPRING 7-2600  
METAL STAMPINGS • SPRINGS • WIRE FORMS

WIRE FORMS BY STANLEY SPRING HAVE  
SOLVED MANY PRODUCTION PROBLEMS!



Use postpaid card. Circle No. 262

testers, available in appropriate sizes for bolt load capacities up to 225,000 pounds. Skidmore-Wilhelm Manufacturing Co., 442 S. Green Rd., Cleveland 21, Ohio.

Use postpaid card. Circle No. 76

#### MULTIPLE NUTSETTERS

Features of the multiple nutsetters are described in 10-page information folder. Included also are engineering drawings and specifications as to dimensional data of the units. Gardner-Denver Co., S. Front St., Quincy, Ill.

Use postpaid card. Circle No. 77



#### MATERIAL HANDLING

A management-oriented publication, GEA-7130, discussing material handling automation systems will be of interest to all who are concerned with cost reductions in the handling of incoming materials, work in progress or finished goods distribution.

The eight-page brochure defines the

concept of Automated Material Control and lists the benefits to be obtained from such systems. The close tie between material handling automation and related data processing functions is illustrated. General Electric Co., Schenectady 5, N.Y.

Use postpaid card. Circle No. 78

#### LAB. WELDING REPORT

Illustrated 24-page brochure, SP-18, shows many products and assemblies that have been welded, along with a physical record of laboratory and experimental work which has resulted in practical mass production schedules. Taylor-Winfield Corp., Warren, Ohio.

Use postpaid card. Circle No. 79

#### ADHESIVE SPECIFICATIONS

Twenty-four page folder lists applicable government specifications and company's comparative product for broad line of adhesives, coatings and sealers. Each adhesive type is listed with the specification, title, intended use and comparable company product. Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn.

Use postpaid card. Circle No. 80

#### PACKINGS AND SEALS

Illustrated brochure and price list describes leather packings for hydraulic and pneumatic applications. It contains measurements and prices of V and

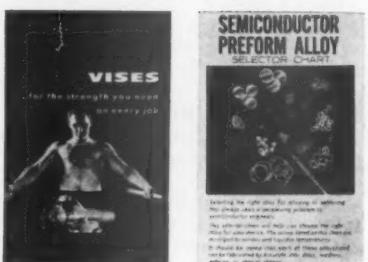
U-packings, cups, flanges, discs and washers. Auburn Manufacturing Co., 306 Stack St., Middletown, Conn.

Use postpaid card. Circle No. 81

#### ASSEMBLY BENCH VISES

A handy pamphlet, No. 712, on vises and their uses gives descriptions and dimensions for the machinists' vises, combination pipe and bench vises, Torco bench vises, Shop King vises, triple duty utility vises, and Cadet auto mechanics' vises. Wilton Tool Manufacturing Co. Inc., 9525 Irving Park Rd., Schiller Park, Ill.

Use postpaid card. Circle No. 82



#### HIGH PURITY SOLDER FOIL

Bulletin Z-109, a two-page data sheet describing high purity precision solder foil, includes complete specifications on solder foil, listing minimum thickness of .0005", width to 6.00"

## PROGRESSIVE makes BIG fixtures

For many years Progressive has pointed the way to better production in American Industry with new ideas in welding equipment and fixtures.

Today Progressive's modern facilities and extensive experience offer dependable solutions to the many unusual problems confronting industry the world over.

This gigantic (24' diameter x 70' length) booster assembly fixture for the Saturn missile, shown above, is a good example of Progressive's tremendous facilities and abilities.

Progressive's experience can save you time and money. Our engineers will gladly discuss your requirements.

THE PROGRESSIVE WELDER & MACHINE CO. 915 Oakland, Pontiac, Mich.

Use postpaid card. Circle No. 263

Assembly & Fastener Engineering



**COLD  
HEADING**  
does it again!

Redesigned for  
Hubbell Cold Heading,  
this Brass Switch Handle is

**STRONGER  
MORE EFFICIENT  
BETTER LOOKING**

and only

**1 1/2 THE COST!**

What's the difference  
compared to this  
old 2-piece  
screw machine and  
stamping method?

Corrosion at joint  
caused breakage

Both ends drilled and shaved

End piece punched  
and pierced

Two pcs. joined by hand

Center post staked

Hubbell cold heading now makes the  
same part in one piece and it's stronger  
— lasts longer — costs far less. The  
customer has only one part to inventory  
and there's no replacement problem  
due to breakage.

If your operation uses large quantities of small  
metal parts formed on automatic screw  
machines, equal or greater savings may be possible  
with Hubbell Cold Heading.

**HARVEY**

**HUBBELL,**

**INCORPORATED**

MACHINE SCREW DEPARTMENT  
BRIDGEPORT 2, CONNECTICUT

Use postpaid card. Circle No. 264

maximum with tolerances on thickness held to plus or minus .0001". In addition to special alloys, the bulletin lists data on 32 standard alloys available as foil. This data includes composition, softening and melting points. Accurate Specialties Co., Inc., 345 Lodi St., Hackensack, N.J.

Use postpaid card. Circle No. 83

#### GUIDE TO AUTOMATION

A wide range of machines and equipment designed to automate metal finishing operations is described in a fully illustrated 29-page guide. Featuring photographs of actual installations the booklet provides profit-increasing data for large or small firms contemplating automation.

Entitled "When to Automate" the booklet also illustrates new types of automatic machinery currently in use by electronic firms for mass production processing of vital components.

The Meaker Co., Nutley, N.J.

Use postpaid card. Circle No. 84



#### HOSE MEASUREMENT

How to measure and relate pipe, tubing and hose sizes is covered in 16-page bulletin No. 631. The "how to" pamphlet discusses standard practices of measuring adapters and complete assemblies. The dash numbering systems commonly used in pipe and tubing measurements are also explained in chart form. Aeroquip Corporation, 300 S. East Ave., Jackson, Mich.

Use postpaid card. Circle No. 85

#### ELECTRIC PARTS CATALOG

The 552 page catalog No. 65 is reportedly the largest and most inclusive in the field. It is divided into sixty-seven product categories including speed reducers, magnetic clutches and brakes, differentials, electronic hardware, teflon terminals and limit stops. Within each category, part numbers, OEM list prices, specifications, and test reports useful in design and prototype work are presented. The catalog is available at no cost from Sterling Instrument, Div. of Designatronics, 5 Sintsink Dr., Port Washington, N.Y.

Use postpaid card. Circle No. 86

#### INSERT CATALOG

Illustrated 28-page Catalog D contains technical data on twenty different series of Keenserts threaded inserts and studs, as well as specifications equivalent to NAS drawings 1394 and 1395. Advantages of the different types



**SECURE YOUR  
PRODUCT QUALITY**  
with

**HUBBELL**  
\*COLD HEADED — ROLLED THREAD  
**FASTENERS**



Hubbell c/h\* turns  
out parts faster,  
better and at  
less cost than screw  
machining ever could  
... they're stronger,  
more accurate and  
more uniform.

Don't be a slave to  
screw machine waste!  
Check Hubbell c/h\*  
today. Free part  
analysis. No  
obligation.

**HARVEY**  
**HUBBELL,**  
**INCORPORATED**  
MACHINE SCREW DEPARTMENT  
BRIDGEPORT 2, CONNECTICUT

Use postpaid card. Circle No. 265

are itemized, and complete instructions for installation and removal of inserts and studs are included. Newton Insert Co., 6500 Avalon Blvd., Los Angeles 3, California.

Use postpaid card. Circle No. 87

#### METAL BRAZING ALLOYS

Special high purity grade precious metal brazing alloys for electronic tubes are described in a new data file. Known as vacuum tube grade alloys, they are composed of gold, silver, platinum or palladium in alloyed or pure form. They are made in various types and compositions to provide brazing properties for almost every re-

quirement, and to permit selection of the most economical alloy without sacrifice of quality or performance.

Technical Service Dept., Engelhard Industries, Inc., 113 Astor St., Newark 2, New Jersey.

Use postpaid card. Circle No. 88

#### TITANIUM FOR MISSILES

A 14-page study summarizes the six major application areas for titanium in missile construction, makes liberal use of case studies. Highlighting the publication are synopses showing the important role titanium is playing in pressure vessels for liquid fueled mis-

siles and a state-of-the-art report on solid rocket motor casings. Titanium Metals Corp. of America, 233 Broadway, New York 7, N.Y.

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#### LOCK WASHER CATALOG

Sizes, catalog number, and prices for complete line of Live Action lock washers are given in 24 page catalog. Each type of washer is photographed and identified by name to assist in ordering proper washer. Shakeproof, Division of Illinois Tool Works, St. Charles Rd., Elgin, Ill.

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#### TRANSISTOR WELDING UNITS

Developments in automatic precision welding equipment for such miniature electronic parts as transistors and diodes are described in six-page illustrated issue of Welding News, Volume 12, Number 2. The range of machines described covers equipment operating in a controlled atmosphere from single point console units to dial feed design capable of 2700 pieces per hour. National Electric Welding Machines Co., Trumbull St., Bay City, Mich.

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**...cut drill-countersinking costs up to 90%!**

**...when installing Nutplate and skin fasteners.**

Tremendous time-saving and cost-cutting advantages make the Winslow Nutplate Drill Motor the most efficient and generally accepted method of installing Nutplate and skin fasteners. Here's how this portable tool operates: The expanding collet is inserted into the clearance hole to which the Nutplate is to be applied. The trigger is then pulled, causing the collet to expand and clamp the tool to the work. The drill-countersinks are then power-fed into the workpiece.

**Winslow**

**NUTPLATE DRILL MOTOR**

Air-Powered

2 holes in 2 seconds!... the fastest known method of installing Nutplate and skin fasteners.

Put this high-speed tool to work for you today.

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A heavy duty tool that approaches automation on portable drill countersinking applications. One of the most sensational cost-saving tools ever introduced to industry.

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A heavy duty tool that replaces angle drills for limited-access-area drilling.



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#### SPRING TENSION FASTENERS

Spring-tension fastening devices are summarized in a four page brochure. Illustrations show customized designs for clamps, clips, latches and locks; pins, retainers, snap rings, hooks and holders, catches, spring washers, hangers and collars. Case history examples demonstrate how spring-like flat stampings can simplify design, cut costs and improve reliability. Associated Spring Corp., 18 Main St., Bristol, Conn.

Use postpaid card. Circle No. 92

#### RETAINING RING PRICES

Bulletin No. 1331 contains complete specifications on Series 1000, 3000 and 3100 industrial retaining rings and their new prices. Industrial Retaining Ring Co., 57 Cordier St., Irvington 11, New Jersey.

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#### COLD HEADED PRODUCTS

Sketches and descriptions of typical cold headed specialties, are contained in the new vest pocket booklet. The 16

**answer to problem on page 46.**  
He lost, even if they played only twice, or four times, or six, or . . .

pages make light, easy reading for technical and purchasing people in metalworking, woodworking, plastics, electronic and all other fields using fasteners and small metal assembly parts. Mr. E. F. Karnes, Sales Manager, John Hassall, Inc., P.O. Box 2217 Westbury, Long Island, N.Y.

Use postpaid card. Circle No. 94

#### SILVER BRAZING ALLOYS

A revised and expanded 24-page, silver brazing alloy manual, ADC 847C, discusses brazing procedures, problems and solutions. Easy-to-read diagrams help select the proper alloy to meet particular industrial needs. Air Reduction Sales Co., 150 E. 42nd St., New York 17, N.Y.

Use postpaid card. Circle No. 95



#### BLIND RIVETS

Comprehensive 12-page booklet TCL-160 contains specifications for rivets of plugged (structural) and hollow (non-structural) types available in aluminum, mild steel and monel. A series of charts, drawings and photographs covers such topics as how to choose the right rivet for the job, recommendations on drill hole size, material thickness guide and application tool guide covering three powered and three hand-actuated rivet setting guns. Cherry Rivet Div., Townsend Company, Box 2157-Z, Santa Ana, Calif.

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#### PLASTIC HARNESS CLAMPS

Polypropylene clamps for use as cable clamps, clip hangers, capacitor clips, wiring clips or harness clamps are illustrated in data sheet. Also included are special clamps of ethyl cellulose and nylon. Holub Industries, Inc., 400 Elm St., Sycamore, Ill.

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#### ILLUSTRATED TOOL GUIDE

Line drawings of screw drivers, nut drivers, pliers, wrenches and specialty tools, are given opposite price listings and stock numbers in 16-page illustrated tool buyers' guide. Vaco Products Co., 317 E. Ontario St., Chicago 11, Illinois.

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#### HI-STRENGTH CARRIAGE BOLT

Information sheet describes high strength carriage bolts used in a variety of applications, such as conveyors, assembly machinery, and power equipment. Also included is comparative strength of bolt to standard carriage bolts. Premier Industrial Corp., 4415 Euclid Ave., Cleveland 3, Ohio

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#### RUBBER BELTING & HOSE

A 60-page catalog covering products in the industrial rubber line is divided into sections on belting, hose, molded products and rubber specialties. The catalog is designed to provide the maximum in technical information. It features extensive data sections giving detailed information on the products listed. Mechanical rubber products, particularly hose, are given the name of the service for which they are intended, making for easy reference.

Cincinnati Rubber Mfg. Co., 4900 Franklin Ave. (Norwood), Cincinnati 12, Ohio.

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#### ANTI-BACKLASH NUT

Anti-backlash nut assembly is fully described in four page bulletin No. A-107. Design specifications, preload torque, preload thrust, and screw thread sizes are covered in design sheet. United Control Systems, Inc., 918 Woodley Rd., Dayton 3, Ohio.

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#### MULTI-GUN SPOT WELDERS

Tips and Dies, Vol. No. 4, No. 1, a four page pamphlet, describes and illustrates fourteen Multi-Gun Welders, and modern methods for mass production of fabricated parts. Federal Machine and Welder Co., Warren, Ohio.

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### SEND FOR YOUR FREE COPY!

TA's new Manual 210G gives you 94 pages of prints, tables, illustrations, specs and installation tips.

Save money for your company. Conserve your valuable time. Don't design clamps when TA offers you 40,000 of them to choose from at off-the-shelf prices!

This free manual shows all sizes and styles of loop clamps, bonding clamps, multiple clamps, center clamps, wire harness clamps, wave-guide clamps—plus blocks, brackets, busbars, line supports, and related items.

Sizes from  $\frac{1}{8}$ " to 6" diameter in 16ths for bolt mountings from #4 to  $\frac{1}{2}$ ". Available in aluminum, steel, and stainless. All manner of high and low temperature insulation materials.

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78

# SHELTON RIVETS

QUALITY • SERVICE • ECONOMY



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SPLIT



INTERNALLY  
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Famous  
Since  
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Shelton has effectively demonstrated its techniques and practical solutions to creative problems in rivets of all types. A sense of personal responsibility and quality control is the prime asset of this company. It is our desire to serve, secure and retain customers, whether they use 25,000 or 25,000,000 rivets, through an attitude of helpful service. We will consider it a privilege to be invited to discuss your needs.

THE SHELTON TUBULAR RIVET CO., Shelton, Conn.

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Assembly & Fastener Engineering

5

Ju

## INDUSTRY MAKES NEWS



Using almost any kind of fuel, portable camp stove will provide adequate cooking heat for ninety minutes.



Stainless steel portable cooking stove packs into compact 5" x 4 1/2" x 1 1/8" unit and is easily carried in camping kit.

### MARCH FASTENER SHIPMENTS

The seasonally adjusted index of fastener shipments for March, 1961 was 76% of the 1956-58 average of 100%.

The figure represents a rise of 2% over February of this year, and 1% over January. Compared with February of 1960, shipments were off 27%.

### BELFORD HEADS FASTENER RESEARCH GROUP

Richard B. Belford has been elected chairman of the Research Council on Riveted and Bolted Structural Joints. Belford is technical advisor of Industrial Fasteners Institute, is a member of the American Society of Mechanical Engineers, American Society of Testing Materials, Society Automotive Engineers, Standards Engineers Society, and Building Research Institute.

Purpose of the council which Belford heads is to further, through research, the basic knowledge of the structural engineering profession on the behavior of bolted and riveted structural steel joints of all types, and under all forms of loading conditions.

The Research Council is a cooperative research activity jointly sponsored by twelve agencies. It is currently supervising research work at the University of Illinois and Lehigh University.

The Council is responsible for the development of high-strength bolting and has issued specifications outlining suitable assembly practices.

### PORTABLE STOVE OF STAINLESS STEEL

A little stove with a thousand uses is made with a "cloak" of stainless steel. Not much bigger than several cigarette packages, the new pocket-sized stove packs enough heating punch to cook a complete meal quickly, even in high winds.

The "Taykit" 101 pocket stove, manufactured by the Taykit Co. of Stryker, Ohio, is 5" x 4 1/2" x 1 1/8". It fits easily in the glove compartment of most automobiles. It weighs 1 1/2 lbs.

A special advantage of the new stove is its ability to use almost any type of fuel; all types of gasoline—white, naptha, regular or ethyl—outboard motor mixture, lighter fluid, and even kerosene. In most appliances of this kind, only unleaded gasoline can be used.



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## FASTENERS—

**Service** — 40 sales representatives all over the country for prompt, fast service.

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**Stock** — Large inventories to ensure out of stock delivery on all catalogued items.

Speed production and lower costs on your products with this GRIP NUT family of GRIPCO FASTENERS. Qualified fastener engineers are available for consultation on all your assembly problems. Consult the yellow pages in your phone book under "GRIPCO" for the one nearest you.

### Other Gripco Products:

- Brass Toplock or Centerlock nuts.
- Miniature weld and clinch nuts, with or without lock.
- Toplock and Centerlock Hi Nuts.
- Standard Semi-finish full and jam nuts.
- Stainless Steel lock, weld and semi-finish nuts.
- Cold formed special nuts or parts to print.

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GRIPCO CLINCH NUT  
With or without self-locking threads. Hex collar prevents turning when torquing bolt.



GRIPCO PILOT PROJECTION  
WELD NUT  
With or without self-locking threads. Centering collar positions nut and protects threads from weld spatter.

The top, sides, grid, burner and deflector are made of type 430 stainless steel manufactured by Allegheny Ludlum Steel Corp.

All the pieces of the midget stove fit easily into the compact steel carrying case. Most of the pieces of the case do double duty, serving as the sides, deflector, and stand for the cooking unit.

One filling of the five ounce container will burn for 90 minutes. The stove regulates itself, and requires no pump to keep the pressure high. After being lit, it creates its own pressure of from nine to twelve lbs. Each stove is factory tested at up to 30 lbs pressure.

### PHEOLL PROMOTES BIELENBERG, MEARS

D. O. Bielenberg has been promoted to a newly created position as director of market research and Frank H. Mears has been named general sales manager, of Pheoll Manufacturing Co.

Bielenberg was formerly distributor sales manager, and in his new position will be engaged in special assignments pertaining to the development of new markets and products for the company.

Mears, who was formerly consumer sales manager, will be responsible for all direct sales and supporting departments including sales engineering services, inventory control, and sales office functions.

Also announced by Pheoll was the change of its Torrington, Conn. subsidiary's name from Progressive Manufacturing Co., to Pheoll of New England, Inc.



BIELENBERG



MEARS



GRIPCO CENTERLOCK NUT  
Locking feature in the center for fast feeding. Can be applied from either end.



GRIPCO COUNTERSUNK  
WELD NUT  
With or without self-locking threads. Countersink protects threads from weld spatter.

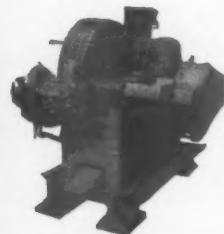
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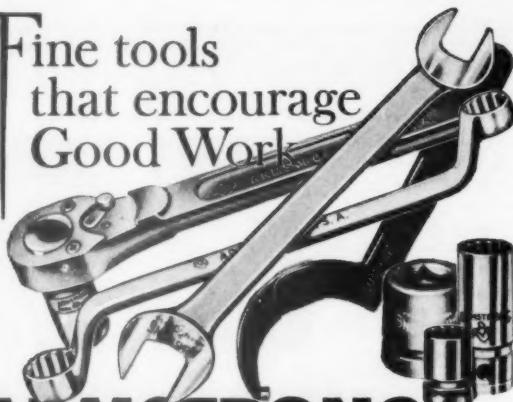


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ARMSTRONG  
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An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without slippage, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN

(carbon steel) Wrenches in baked-on gray enamel with heads ground bright... all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant... 1537 different industrial sizes and types... single wrenches, or sets in metal cases, boxes or rolls... each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

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### Why is SPIROL PIN the true spring a more versatile fastener?

SPIROL PINS are used in a wider variety of materials:

To provide spring pins that will not damage, distort or rupture holes even in soft, brittle or thin materials, SPIROL PINS come in MEDIUM and LIGHT DUTY, as well as Heavy Duty for more rugged uses. The entire length of a SPIROL PIN assumes the shape of its hole radially, giving greater shear, shock and vibration resistance. Therefore, MEDIUM and LIGHT DUTY PINS apply where other flexible pins cannot be used.

Where corrosion resistance is needed, SPIROL PINS are the only spring pins stocked in NICKEL STAINLESS STEEL (302). Two sizes are used in the water faucet shown above. Automatic Assembly: SPIROL PINS cannot interlock

and jam hoppers. Uniform chamfer on both ends speeds inserting pins into holes.

Most complete range of standard diameters:

MINIATURE SPIROL PINS (.032", .039", .044", .052") thru  $\frac{1}{4}$ ".



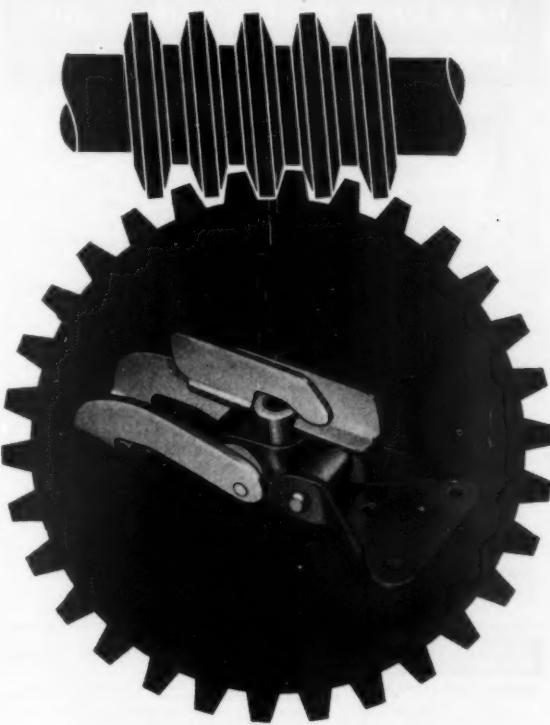
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June, 1961

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The tremendous mechanical advantage of the time-tested worm-gear mechanism is at your disposal in Bassick's "Gear Lock" clamp series... the only clamp of its kind manufactured.

Each Gear-Lock clamp can sustain a force of up to 2000 pounds—twenty times greater than the best resilient clamp. Gear-Locks are designed especially for air-tight, pressure-tight, or de-humidified containers of steel, aluminum, plastic or other materials. They're secure against shock and vibration, and can be fixed in a literally infinite number of closing positions, eliminating the necessity for "custom mounting" each clamp.

Gear-Lock clamps are just one of the extensive assortment of clamps, fasteners, strikes, springs, and levers manufactured by Bassick for both military and general industrial use. You'll find the complete line, plus a variety of typical applications, described and illustrated in Bassick Catalog No. CF-60.

Write for your copy today. THE  
BASSICK COMPANY, Bridgeport 5, Conn.  
In Canada: Belleville, Ont.

1-12  
See our catalog in Sweet's Product Design File

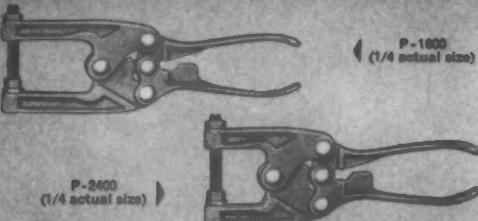


BASSICK  
CLAMPS  
FASTENERS



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**Another step forward  
KNU-VISE TOGGLE PLIERS with  
1600 & 2400 lbs. clamping force**



In keeping with its reputation for providing the industry's most efficient toggle clamps and pliers, Lapeer Manufacturing Company has introduced new plier models—the P-1600 and P-2400 series.

Long and comfortable handles are a feature of these Lapeer Knu-Vise pliers. With average handload, these pliers provide a clamping force of 1600 and 2400 lbs. respectively. The P-1600 series has a throat depth of  $2\frac{1}{4}$ ", and throat gaps of  $1\frac{1}{8}$ , 3, 4 and 6 inches. The P-2400 series has a throat of  $1\frac{1}{8} \times 1\frac{1}{4}$ ". Each series is available with two opposing spindles. All models can be furnished with unlocking levers. The pliers are made from steel forgings, heat-treated, and cadmium plated.

Write for more information and remember—LAPEER KNU-VISE GIVES YOU MORE VALUE FOR YOUR MONEY.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

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CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.  
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Pheoll was recently acquired by Allied Products Corp. of Detroit. Allied manufactures tools and dies and automotive and aircraft parts.

**PARKER-KALON APPOINTS TWO REPS.**

Clyde J. Randall has been appointed field sales engineer for Parker-Kalon. He will serve as fastener consultant contacting distributors and their customers throughout West Virginia, western Pennsylvania and eastern Ohio.

Before joining Parker-Kalon, Randall was southern district manager for Osborn Manufacturing Co.

Noble L. Davis has been appointed field sales engineer for the upper New York state and north central Pennsylvania area.

Prior to joining the company, he was sales engineer for the Pheoll Manufacturing Co.



RANDALL

DAVIS

**NAMED PRESIDENT OF SUPERIOR PNEUMATIC**

Walter I. Krewson, Jr. has been named president of Superior Pneumatic & Manufacturing, Inc. Kenneth Lang was named as vice-president and director of sales.

Krewson announced plans to introduce a new metal fastening device that will replace a 20 ton punch press. Superior now manufactures a line of air hammers, drills, sanders and die grinders for the industrial and automotive trade.



Supple, lightweight, flexible air hose for all air tools or air operated overhead equipment. Extends easily, retracts automatically. Neater, safer working conditions.

**■ Synflex Self-Storing Nylon Air Hose** replaces conventional hose. It's lighter, easier to work with, lasts longer, costs less. Oil-proof. Extends to 30 times retracted length. No swelling to throttle air flow now or ever. Working pressures: Standard weight 170 psi; heavy duty 250 psi. 4 to 1 safety factor. Sizes:  $\frac{3}{16}$  thru  $\frac{1}{2}$  ID.



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Samuel Moore & Co.  
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"Star screws have clean,  
bright'n shiny heads."



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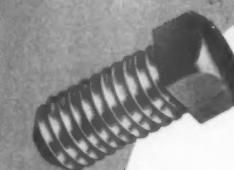
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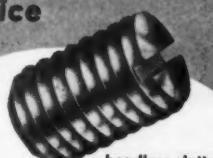
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since 1880  
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INCREASE PRODUCTIVITY**

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GENUINE  
**CUSHION GRIP NUT DRIVER**

Blisterproof  
oil & water  
resistant  
Nitrile  
Rubber Grip  
permanently  
locked into  
tough amber  
handle

New! Patented  
Interlocked "Tongue &  
Groove" Handle . . . Cannot  
slip, slide, twist or come off

Now for the first time you can obtain Nut Drivers with all the proven advantages of the famous Bridgeport Nitrile Rubber CUSHION GRIP!

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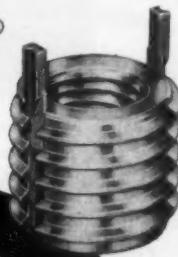
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**NEW**

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**and...**

**Equivalent  
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Regardless of cost, the best fastening devices aren't worth a cent if corrosion shortens their useful lives. Driv-Lok grooved pins can be produced in a variety of metals and finishes designed to give you a positive lock, lasting through harmful effects of moisture, acids, alkalies, oils, solvents and other chemicals.

From its raw material inventory of carbon and alloy steels, stainless, silicon bronze, brass and aluminum, Driv-Lok can fill your need for corrosion-resistant pins in extremely short order.

Finishes? Standard is zinc electro plate. Heavier deposits, dichromate dips, and other finishes such as brass, nickel, cadmium and black oxide, are immediately available.

Let us show you how effective, versatile and corrosion-resistant, DRIV-LOK grooved pins can be. Send for your free catalog or give us a call, Sycamore 2148.



## DRIV-LOK SALES CORPORATION

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### NEW "CLOSE CLUSTER" DIE PROCESS CUTS BRAZING PREFORM WASTE, SAVES YOU MONEY!

Scrap means waste. And that adds to the cost of your silver brazing preforms. Precision dies arranged in a "close cluster" make maximum use of every inch of silver brazing or precious metal strip. This cuts waste, saves you money. Developed originally by Alloys Unlimited for the semiconductor industry, this new technique of "close cluster" stamping makes other methods old-fashioned. Start saving. Send us your specifications, then compare our bids with your present costs. No obligation, of course.

Alloys Unlimited, Inc., 21-01 45th Ave., Long Island City, N.Y.

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## ELECTED DIRECTOR OF ILLINOIS TOOL WORKS

Eugene W. Fuller, executive vice president, Illinois Tool Works, was elected a director at the company's recent annual meeting.

Associated with ITW since 1928, Fuller has served in various administrative and executive capacities, particularly in the management of the company's industrial fastener product lines. He formerly was sales manager, and later general manager, of the company's Shakeproof Division. Fuller was elected a vice president in 1950 and executive vice president in 1959.



## ARO EQUIPMENT CHANGES NAME

Aro Equipment Corp., manufacturer of measuring and dispensing pumps, has changed its name to Aro Corporation. The name change was approved at a recent meeting of the company's board of directors.

## INDUSTRIAL STANDARDIZATION SEMINAR

Industrial standardization will be the topic of a five-day seminar to be conducted June 19 through 23 by Dr. John Gaillard, consultant on industrial standardization, in the Engineering Societies Building in New York City.

The 30th such seminar of its kind, the five-day meeting is designed to assist companies in the organization of their standardization work and training of staff members.

## HARTMAN APPOINTED V.P. AT PALNUT CO.

Richard A. Hartman has been appointed vice president and product manager of The Palnut Co., Division of United-Carr Fastener Corp.

IMPORTANT NEWS FOR SILVER BRAZING PREFORM USERS

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CAT. NO.	A	B	C	D	E	F
4-S. JN	15/32	3/64	9/32	9/16	6-32	43/64
4-L. JN	15/32	3/64	9/32	3/4	6-32	43/64
* 6-S. JN	17/32	1/16	3/8	11/16	10-24	25/32
** 8-S. JN	5/8	1/16	27/64	3/4	1/4-20	13/16

S for 0" to  $\frac{1}{8}$ "; L for  $\frac{1}{8}$ " to  $\frac{3}{8}$ "

\* 8-32 & 10-32 threads available

\*\* 10-34 & 12-34 threads available

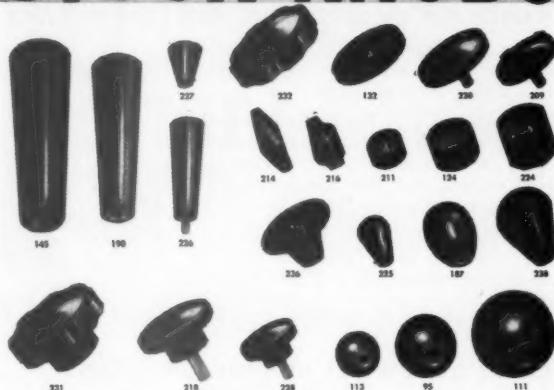
NOTE: 4-S. JN & 6-S. JN also available in brass

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Assembly & Fastener Engineering

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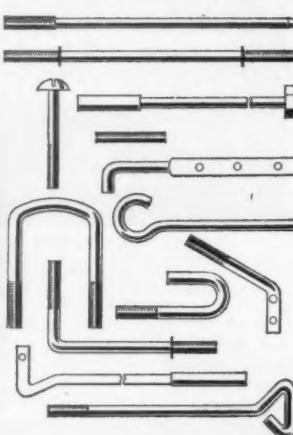
Wide selection molded plastic knobs, handles, hand-wheels at no tooling charge! Minor changes (inserts, threads, color, etc.) to suit requirements. Other modifications give your part a look of exclusive design at fraction of new mold cost! Write for complete illustrated catalog, or see Sweet's Product Design Catalog File.

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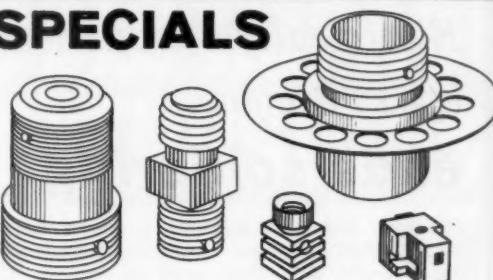
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June, 1961

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**SEAL** . . . against fluid leakage along the threads

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Hartman joined the firm in 1956, having held various sales and engineering positions during his career in the fastener industry since 1938. In his new position, he will be responsible for product improvement and the development and promotion of new fasteners for the emerging and changing needs of the automotive, appliance, electrical and other hard goods industries.

### NAMED S.M. OF DETROIT POWER SCREWDRIVER

Donald P. Lamb has been appointed general sales manager for Detroit Power Screwdriver Co.

The company, a wholly owned subsidiary of Link-Belt Co., manufactures selective parts feeders; screw, nut and stud driving machines and special assembly equipment.

Lamb joined Detroit Power Screwdriver in 1957 as a supervisor of field sales and engineering. Prior to this he headed his own sales company for parts feeding and assembly equipment in Michigan.



### CLECO ANNOUNCES CHANGES IN SALES

John Hobbis, former salesman in the firm's Newark, N. J. division, has been named manager of Cleco Air Tool's Cleveland Division. Hobbis was associated with New York Pneumatic Tool Division of Ingersoll Rand Co. for eight years prior to joining Cleco in 1951.

Walter S. Spott succeeds Hobbis in the Newark Division. Before this recent assignment he had served as Newark regional sales engineer.

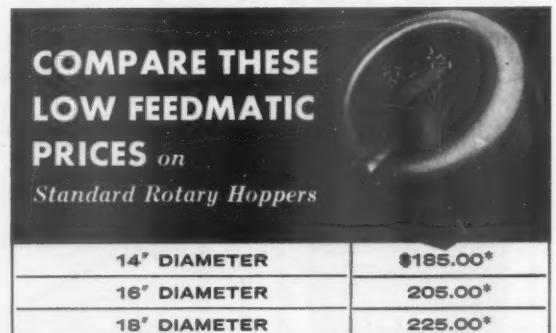
E. T. Peacock has joined Cleco as assistant to the Chicago sales division manager. Peacock was formerly associated with the Ford Motor Company.

### NOW! . . . the industry's finest AUTOMATIC PARTS FEEDERS

*at the industry's lowest prices!*

If your operation involves the manufacture or processing of parts in volume quantities, it will pay you to investigate the cost saving advantages of Feedmatic-Detroit automated equipment.

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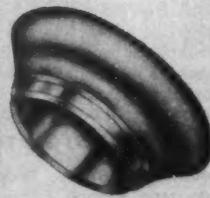
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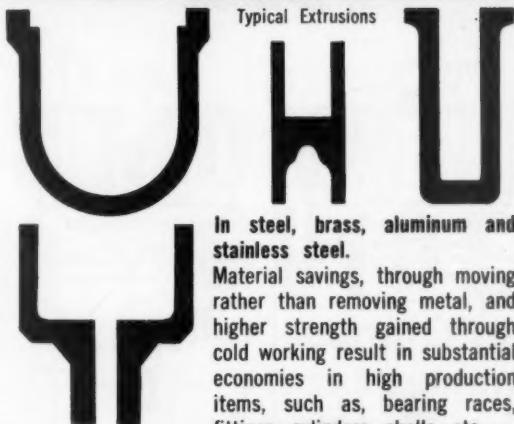
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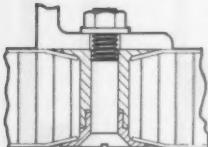
Available in Stainless Steel, Brass, Aluminum and Steel  
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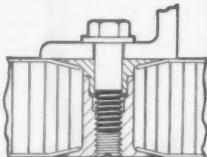
# HONEYCOMB and sandwich panel FASTENERS

by **Delron**

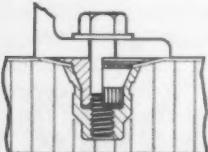
PATENT PENDING



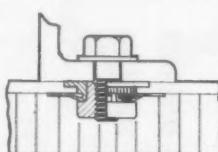
**GROMMET FASTENER**  
Series 101 and 102  
Thru-Rivet and Thru-Bolt Type



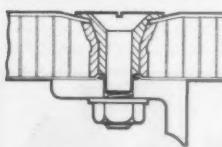
**GROMMET FASTENER**  
Series 103  
Series 104 (Self-Locking)



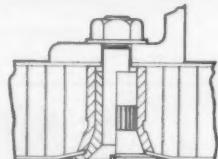
**BLIND FASTENER**  
Series 293  
Internal Thread Blind Type



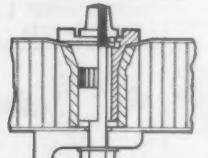
**BLIND FASTENER**  
Series 293K  
Threaded Clinch Type



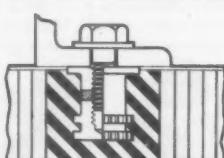
**STRUCTURAL FASTENER**  
Series 600 Flared  
Thru-Rivet and Thru-Bolt Type



**STRUCTURAL FASTENER**  
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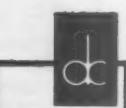


**STRUCTURAL FASTENER**  
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## NAMED V.P. AT TUBULAR RIVET & STUD CO.

At the annual meeting of the directors of Tubular Rivet and Stud Co., Charles E. Smith was elected vice president-in-charge of production. Most recently, Smith had been production manager. He had previously served as foreman, general foreman, assistant superintendent and superintendent of the machine division. He has been with the company 15 years.



## BERG JOINS ROTOR TOOL CHICAGO OFFICE

Russell B. Berg has been named a Chicago area service engineer for the Rotor Tool Co. Berg joins the company after five years with Porter Cable Co. in Chicago.

In his new post, Berg will handle sales and servicing of Rotor air and high cycle portable tools in central Chicago and Illinois, from the Chicago office.



## THOMPSON-BREMER PRES. PASSES AWAY

Henry T. Chamberlain, president of Thompson-Bremer & Co., passed away in an Evanston, Illinois, hospital on May 10, 1961.

Chamberlain had been president of Thompson-Bremer since 1951. He was formerly dean of students at Loyola University in Chicago, an accountant for a Chicago firm, and wrote a weekly article on business and finance for a Chicago newspaper.

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# CAUTION!

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## JULY is VERIFICATION MONTH

Our circulation auditors require certain information about every reader to qualify him as a recipient of Assembly and Fastener Engineering. The protective wrapper around your July issue will contain a form to be used to give us this information. Proper completion of the form and prompt mailing to us in your company envelope will assure your continued receipt of this magazine. We will appreciate your help.

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CHALLENGED BY RISING COSTS,  
CHANGING MARKETS, FOREIGN  
COMPETITION

# COST REDUCTION GUIDE

## CONTENTS

### Section One—Organization, Developing and Promoting A Cost Reduction Program.

- I Cost Reduction—A Management Function
- II What Management Can Do About Cost Reduction
- III Cost Reduction Co-ordinator
- IV Cost Reduction Specialist
- V Developing the Cost Reduction Program
- VI Waste Prevention
- VII Operations Analysis
- VIII Promoting the Cost Reduction Program

### Section Two—Case Histories In Cost Reduction.

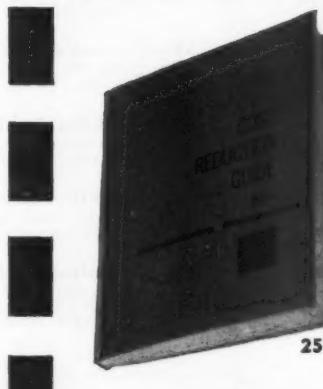
- IX The Case Of The \$40 Million Inventory
- X The Case Of The Profitable Product
- XI The Case Of The Co-ordinated Package
- XII The Case Of The Un-Controlled Inventory
- XIII The Case Of The Successful Sales Planning And Distribution Program
- XIV The Case Of The Immediate Inventory Reduction—A Crash Program

### Section Three—Operation Analysis Audit

- Financial Control
- Industrial Engineering
- Industrial Relations
- Manufacturing Operations
- Product Engineering
- Production And Inventory Control
- Quality Control
- Marketing
- Purchasing

### Section Four—Exhibits

- Exhibit A Cost Reduction Newsletter
- Exhibit B Cost Reduction Committee Minutes
- Exhibit C Cost Reduction Progress Report
- Exhibit D How And Where To Cut Waste
- Exhibit E Waste Which Foremen Can Prevent
- Exhibit F Cost Reduction Idea, "MT" Day
- Exhibit G Principal Tools Of Work Simplification
- Exhibit H Package Planning Check List
- Exhibit I Adams Computer Characteristics Chart



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This complete guide is packed with dollar-saving ideas and programs for manufacturers. The authors have spent nearly seven years in compiling data in the field of cost reduction and administration. Much of the material is based on successful cost reduction efforts of more than forty companies. This book provides management with complete programs including sample directives, assignments, forms and progress reports. Written in non-technical language, it offers step-by-step instructions for instituting and carrying out complete programs for cutting costs.

More than 1200 self-appraisal questions are included embracing administration, financial control, industrial engineering, industrial relations, manufacturing operations, production control, purchasing, marketing and quality control. These probing, cost-related questions provide an opportunity to audit a company's entire operation.

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Used to facilitate the assembly of instrument panels.

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Rivets less than 5/64" long used in hearing aids, dictating equipment, radio receivers.

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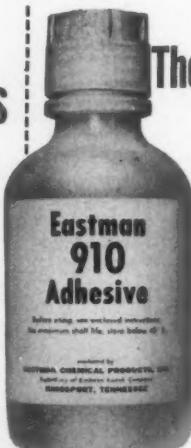
#### Here are the types of bonds that can be made with Eastman 910 Adhesive

Among the stronger: *Natural rubber, SBR, Buna N, most types of neoprene, steel, aluminum, brass, copper, most woods, vinyls, phenolics, cellulosics, polyesters, polyurethanes, and nylon.*

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The use of Eastman 910 Adhesive is not suggested at temperatures above 175°F., or in the presence of extreme moisture for prolonged periods.

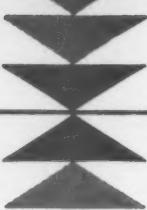
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## ONE LAST WORD

### ECONOMIC INSULARITY



**I**solationism has been rooted out of our American ideology. This is good and we can be thankful; however, when we root out one old bush we leave a hole, and holes, as we all know, must be filled. One can't leave a gaping hole in the landscape, can one? Have we substituted for isolationism another false "ism" as pernicious and deadly as the first? Have we substituted economic insularity?

By economic insularity, we mean thinking economically only in terms of our domestic economy and private prejudices and not in terms of world markets, world economic conditions, and the relation of individual demands to the whole.

While our government is oriented to world-wide situations and cannot be isolationist in that regard, its economic thinking is naively insular. It doesn't equate the industrial health of the nation with world market conditions. While it says world trade is a two-way street and tariffs are not good, with which we wholly agree, the government does not provide the climate in which industry can operate competitively to meet the problems brought about by the free flow of commerce.

Sometimes it seems that government, under the leadership of bushy-tailed theorists, is deliberately determined to hack business down. While much is being done to pamper labor, the farmer and vested interests, nothing is being done to

encourage industry to be strong and productive. The thinking of too many government theorists is oriented to do-goodism; their economic thinking is tied to the kite of sociological progress. This is not even thinking in terms of economic insularity; it cannot be considered thinking at all. Pipe dreaming is a better word.

While we may regard this as a frustrating situation, reflect on the many able government executives who are aware of this problem and who battle valiantly, day after day, amid a thousand frustrations, that their voices might be heard.

Business, too, in many areas suffers from the same malady. While complaining about imports, is it making determined moves to export and capture foreign markets with better products at lower prices? Doesn't all the world hold many American products in high esteem and clamor for them? Isn't the world industrialization movement triggered by this vision: If Americans have two cars in every garage and two chickens in every pot, why can't we? Is business supplying the washing machines, refrigerators, vacuum cleaners and other consumer products? Business suffers here from economic insularity in its thinking.

After all is said and done, might we not say, our thinking is small when it should be big; it is narrow when it should be broad; it is greedy when it should be progressive?

*Wm. F. Schleicher*

Vice President

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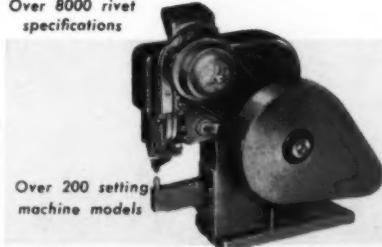
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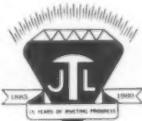
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